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**PHASE I MARINE ARCHEOLOGICAL REMOTE SENSING SURVEY
OF THE CALCASIEU RIVER
SALTWATER BARRIER REPAIR PROJECT**

April 1999

Final Report

**R. Christopher Goodwin & Associates, Inc.
241 East Fourth Street, Suite 100
Frederick, Maryland 21701**

Prepared for

**U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160**

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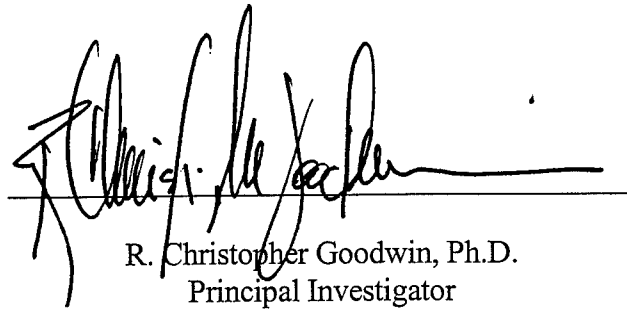
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Final Report



R. Christopher Goodwin, Ph.D.
Principal Investigator

by

Jean B. Pelletier, M.A., David Trubey, B.A., William Barr, M.A.,
Susan Barrett Smith, M.A., Jeremy Pincoske, M.A., and Patrick Robblee, M.A.

R. Christopher Goodwin & Associates, Inc.
241 East Fourth Street, Suite 100
Frederick, Maryland 21701

April 1999

for

U.S. Army Corps of Engineers
New Orleans District
P.O. Box 60267
New Orleans, LA 70160

ABSTRACT

This report presents the results of the Phase I Marine Archeological Remote Sensing Survey for Calcasieu River Saltwater Barrier Project, Calcasieu Parish, Louisiana. These investigations were conducted during December 1998, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD). The study was undertaken to assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended. All aspects of the investigations were completed in accordance with the Scope-of-Work, and the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48, No 190, 1983).

The planned repairs to breaches in the Calcasieu River Saltwater Barrier will require the placement of 12,000 tons of stone in five locations within the project area for the construction of a non-continuous rock dike. The survey area for this project measures approximately 23.7 acres [150 ft (45.72 m) x 6,700 ft (2042.18 m)] and extends along the left descending bank of the river. The objectives of this study were to identify specific targets within the project area that might represent significant submerged cultural resources, and to provide the USACE-NOD with management recommendations for such resources. These objectives were met with a research design that combined background archival investigations and a marine archeological remote sensing survey.

Background research and archival investigations indicated a moderate potential for encountering submerged historic cultural resources within the project area. A review of Louisiana archeological site files and relevant research reports documented only two terrestrial archeological sites within a one mile (1.6 km) radius of the project area; however, none of the sites were reported within the boundaries of the project area. A review of Louisiana's shipwreck database, the National Oceanic and Atmospheric Administration's (NOAA) Automated Wreck and Obstruction Information System (AWOIS) and several secondary sources yielded no reported vessel losses in the project area.

Archeological investigations consisted of a controlled marine remote sensing survey of approximately 9 linear miles (14.48 km) of river bottom. This survey utilized a differential global positioning system (DGPS), a digital recording side scan sonar, a digital recording sub-bottom profiler, a recording proton precession magnetometer, and hydrographic navigational computer software. The survey was conducted with a lane spacing of 25 ft (7.62 m) to ensure the greatest detail in coverage. If any historic vessels had been abandoned or destroyed in the survey area, they would have been readily detectable with the remote sensing instruments employed during the survey.

The marine remote sensing survey registered total of 30 individual magnetic anomalies. A total of 14 acoustic anomalies were recorded by the side scan sonar and 10 by the sub-bottom profiler.

Archival records and analysis of the archeological data collected during the study yielded no evidence suggesting the presence of potentially significant cultural resources within the project area. Therefore, no additional investigations are warranted or recommended for the proposed Calcasieu River Saltwater Barrier Repair Project area.

TABLE OF CONTENTS

REPORT DOCUMENTATION PAGE.....	i
ABSTRACT	v
LIST OF FIGURES.....	xi
LIST OF TABLES	xv
 I. INTRODUCTION.....	 1
Organization of the Report.....	1
 II. NATURAL SETTING	 5
Geologic Setting	5
General Physiographic Setting.....	6
Geologic Controls.....	11
Geomorphic Processes and Depositional Environments.....	12
Pleistocene Prairie Complex (PPC)	13
Holocene Natural Levees (HNL)	13
Backswamp (Bs).....	14
Distributary Channel Deposits	14
Estuarine Deposits	19
Geologic History and Chronology	19
Geoarcheological Considerations	20
Prehistoric Period	20
Historic Period	23
Climate.....	23
 III. PREHISTORIC CULTURAL SETTING.....	 25
Paleo-Indian Stage (ca. 10,000 – 8,000 B.C.)	25
Archaic Stage (ca. 8,000 – 1,200 B.C.)	28
Early Archaic Period	29
Middle Archaic Period	30
Late Archaic Period.....	31
Poverty Point Cultural (ca. 1,500 – 500 B.C.).....	32
Woodland Stage (ca. 500 B.C. – A.D. 1000)	34
Tchefuncte Culture (ca. 500 B.C. – A.D. 1)	34
Marksville Culture (ca. A.D. 1 – 400)	36
Troyville-Coles Creek Cultures (ca. A.D. 400 – 1200).....	37
Mississippian Stage (ca. A.D. 1200 – 1700).....	40
Emergent Mississippian Period (A.D. 1200 – 1450/1700)	40
Late Mississippian Period (A.D. 1450 – 1700)	41
Protohistoric and Historic Period (A.D. 1500 – 1800).....	42

IV.	HISTORIC OVERVIEW.....	45
	Introduction	45
	French Colonial Period.....	45
	Spanish Colonial Period	46
	Territorial Era.....	49
	Antebellum Era	50
	Cantonment Atkinson.....	50
	Calcasieu Parish.....	57
	Civil War	65
	Postbellum Era	69
	Twentieth Century.....	73
	Summary.....	74
V.	ARCHEOLOGICAL POTENTIAL.....	77
	Introduction	77
	Previously Conducted Surveys Within 5 mi (8 km) of the	
	Calcasieu River Project Area.....	77
	Calcasieu Parish.....	81
	Multiple Parishes	85
	Previously Recorded Archeological Sites Located within 1 mi (1.6 km)	
	of the Calcasieu River Project Area	86
	Site 16CU174.....	86
	Site 16CU193.....	86
	Previously Recorded Standing Structures Location within Approximately	
	1 mi (1.6 km) of the Calcasieu river Project Area	87
	Lake Charles Historic District.....	87
	Previously Recorded Shipwrecks Located within 1 mi (1.6 km) or the	
	Calcasieu River Project Area.....	87
	Potential of Submerged Resources	88
VI.	RESEARCH METHODS.....	89
	Archival Investigations	89
	Archeological Investigations	89
	Marine Remote Sensing Survey.....	89
	Positioning.....	90
	Magnetometry	90
	Acoustic Imaging	97
	Survey Control and Correlation of Data Sets.....	98
	Remote Sensing Data Analysis	98
VII.	SURVEY RESULTS	103
	General Overview of the Survey Results	103
	Target #1	103
	Target #2	104
	Target #3	104
	Target #4	104
	Target #5	125

VIII. PROJECT SUMMARY AND MANAGEMENT RECOMMENDATIONS.....	137
REFERENCES CITED.....	139
ACKNOWLEDGEMENTS.....	159
SCOPE OF WORK	Appendix I
RESUMES OF KEY PROJECT PERSONNEL.....	Appendix II

LIST OF FIGURES

Figure 1.	Calcasieu River Salt Water Barrier Repair Project Area	3
Figure 2.	Location map of the Calcasieu River saltwater barrier repair area showing the Lake Charles, 2 O'clock Point area. From USGS Moss Bluff Quadrangle 7.5- Minute Series (Topographic) and USGS Lake Charles Quadrangle 7.5-Minute Series (Topographic).....	7
Figure 3.	Map of the Quaternary deposits of southwestern Louisiana and southeastern Texas. Hcp=Holocene Chenier plain; Pi=Intermediate complex; Pp=Prairie complex; Pu=Upland complex. From Saucier and Snead 1989.....	9
Figure 4.	Distribution of Pleistocene Prairie complex and Holocene environments of deposition in the Lake Charles area. Project area is indicated by heavy line along river bank. PPC=Pleistocene Prairie complex; Bs=Holocene backswamp; NL=Holocene natural levee.....	15
Figure 5.	Geologic cross section along the U.S. 90/I-10 highway corridor across the Calcasieu River valley. For location of corridor, see Fig. 3. Modified from Nichol, Boyd and Penland 1996.....	17
Figure 6.	Typical distribution of subaerial and subaqueous environments of deposition in a delta lobe. From Coleman and Roberts 1991	21
Figure 7.	[1760] Excerpt from an untitled map of Louisiana, in reference to the project vicinity. Excerpt depicts the Atacapas [Attakapas] region	47
Figure 8.	[1820] Excerpt from Tanner's Louisiana and Mississippi, in reference to the project vicinity. Excerpt depicts the southwestern Louisiana prairies and the Sabine/Calcasieu River region	51
Figure 9.	[1816] Excerpt from Darby's Map of the State of Louisiana, with Part of the Mississippi Territory, in reference to the project vicinity. Excerpt depicts state boundaries and early parish divisions (Campbell 1921:416).....	53
Figure 10.	[1845] Excerpt from Mitchell's Map of the States of Louisiana, Mississippi & Alabama, in reference to the project vicinity. Excerpt depicts southwestern Louisiana parish divisions and the western Sabine River boundary	55

Figure 11.	[ca. 1838] Excerpt from [Boynton's] Louisiana, in reference to the project vicinity. Excerpt depicts Cantonment Atkinson within Opelousas County [Imperial St. Landry Parish].....	59
Figure 12.	[1849] Excerpt from Mitchell's A New Map of Louisiana, in reference to the project vicinity. Excerpt depicts the town of Marion (parish seat of Calcasieu) and the Old Spanish Trail extending through the Calcasieu Prairie to Texas.....	61
Figure 13.	[1860] Excerpt from Mitchell's County Map of Louisiana, Mississippi, and Arkansas, in reference to the project vicinity. Excerpt depicts the Lake Charles Courthouse and the former Calcasieu Parish seat, Marion.....	63
Figure 14.	[1861] Excerpt from Holle & Co.'s Hydrographic & Topographical Map of Parts of the States of Louisiana, Mississippi & Alabama, in reference to the project vicinity. Excerpt depicts Lake Charles, Lake Calcasieu, the Calcasieu River, and the Sabine River and Pass	67
Figure 15.	[1881] Excerpt from Rand, McNally & Co.'s Louisiana, in reference to the project vicinity. Excerpt depicts southern Louisiana waterways and railroad lines	71
Figure 16.	[1899] Excerpt from Rand, McNally & Company's map of Louisiana, from Indexed Atlas of the World, in reference to the project vicinity. Excerpt depicts railroads traversing southwestern Louisiana	75
Figure 17.	Spatial distribution of the magnetic anomalies found in the Calcasieu River Saltwater Barrier Project area.	91
Figure 18.	Array of instruments used during the Calcasieu River Saltwater Barrier Project.....	93
Figure 19.	Hypack magnetic data screen showing the four types of magnetic signals usually seen during a magnetic survey	95
Figure 20.	Block#1, Target #1 magnetic anomaly contour map showing dipolar anomaly associated with pipeline crossing.....	105
Figure 21.	Block #1, shoreline showing the breach in the saltwater barrier and sign indicating a pipeline crossing.....	107
Figure 22.	Block #1 Side Scan Sonar image showing rock armor over pipeline crossing. Upper right hand corner of image is a zoomed image of the rock armoring.....	109
Figure 23.	Block #1 Sub-bottom Profile image of pipeline trench and rock cap associated with pipeline crossing Block#1	111

Figure 24.	Target #2, Block #2, magnetic anomaly contour map showing large isolated monopolar anomaly	113
Figure 25.	Block #3, Target #3, magnetic contour plot of pipeline crossing area showing monopolar, and dipolar anomalies	115
Figure 26.	Side Scan Sonar image of the pipeline crossing the northern terminus of Block #3	117
Figure 27.	Northern terminus of survey Block #3 showing signs indicating pipeline crossing and rock armor of the pipeline entry into the river channel	119
Figure 28.	Block #3, Target #4, magnetic contour plot of complex magnetic anomaly with long linear trends of monopolar anomalies possibly associated with the adjacent partially submerged wooden bulkhead.....	121
Figure 29.	Side Scan Sonar image of the submerged wooden bulkhead associated with Target #4.....	123
Figure 30.	Block #3, Target #5, magnetic contour plot of an isolated anomaly possibly associated with the Charles Olmsted shipyard.....	127
Figure 31.	Color Side Scan Sonar image of shipwreck discovered at the Olmsted's shipyard. The shadows of the vessel show the relief of vessel. Note the cabin and deck structures	129
Figure 32.	B/W Side Scan Sonar image of shipwreck discovered at the Olmsted's shipyard. The shadows on both sides on the vessel show the relief of vessel and deck structures	131
Figure 33.	B/W Sub-bottom Profile image of the cross section of the shipwreck discovered during the Calcasieu river Saltwater Barrier.....	133
Figure 34.	Southern terminus of Block #3, Charles Olmsted's shipyard area with several scrap barges in background, and Tug Boat wreck site in foreground .	135

LIST OF TABLES

Table 1.	Previously Conducted Cultural Resource Surveys within 5mi (8 km) of the Proposed Project Area	78
Table 2.	Previously Recorded Archeological Sites within 1 mi (1.6 km) of the Proposed Project Area	86
Table 3.	Inventory of Magnetic Anomalies from the Calcasieu River Saltwater Barrier Remote Sensing Survey Block 1	99
Table 4.	Inventory of Magnetic Anomalies from the Calcasieu River Saltwater Barrier Remote Sensing Survey Block 2	99
Table 5.	Inventory of Magnetic Anomalies from the Calcasieu River Saltwater Barrier Remote Sensing Survey Block 3	99
Table 6.	Inventory of Acoustic Anomalies from the Calcasieu River Salt Water Barrier Remote Sensing Survey	100
Table 7.	Inventory of Sub-Bottom Acoustic Anomalies from the Calcasieu River Salt Water Barrier Remote Sensing Survey Block 1	102
Table 8.	Inventory of Sub-Bottom Anomalies from the Calcasieu River Salt Water Barrier Remote Sensing Survey Block 2	102
Table 9.	Inventory of Sub-Bottom Anomalies from the Calcasieu River Slat Water Barrier Remote Sensing Survey Block 3	102

CHAPTER I

INTRODUCTION

This report documents the results of the Phase I Marine Archeological Remote Sensing Survey for the Calcasieu River Saltwater Barrier Project, Calcasieu Parish, Louisiana (Figure 1). The project area extends from along the river's left descending bank for approximately 6,700-ft (2042.18 m). This study was undertaken on behalf of the U.S. Army Engineers, New Orleans District, in support of the proposed construction of a non-continuous rock dike to repair breaches in the saltwater barrier. The dike is intended to stop the intrusion of saltwater into the Calcasieu River above the saltwater barrier, and to armor the riverbank against any further erosion. Five segments of dikes along the left descending bank, ranging in length from 110 ft (33.53 m) to several hundreds of feet, are proposed for construction.

In keeping with the New Orleans District's mission to preserve, document, and protect significant cultural resources, a magnetic, acoustic and sub-bottom remote sensing survey was undertaken to locate potential archeological remains. All archeological investigations were accomplished in full compliance with the National Historic Preservation Act (NHPA) of 1966, as amended; with 36 CFR 800, "Protection of Historic Properties;" with the Abandoned Shipwreck Act of 1987 (43 U.S.C. 2101-2106); with Abandoned Shipwreck Guidelines, National Park Service; and with National Register Bulletin Nos. 14, 16, and 20; and, 36 CFR 66.

Organization of the Report

This report places the project area within its natural and historical contexts and seeks to examine the findings of the field investigations within those contexts. The natural setting of the project area is discussed in Chapter II. Chapter III places the project area within its prehistoric context while Chapter IV places the project area within its historic context. Chapter V examines the potential for identifying significant cultural resources in the project area based on previous investigations. Details concerning the instrumentation and methods employed during survey are described in Chapter VI. The results of the survey and recommendations to avoid impacting any potentially significant cultural resources within the project area are presented in Chapter VII.

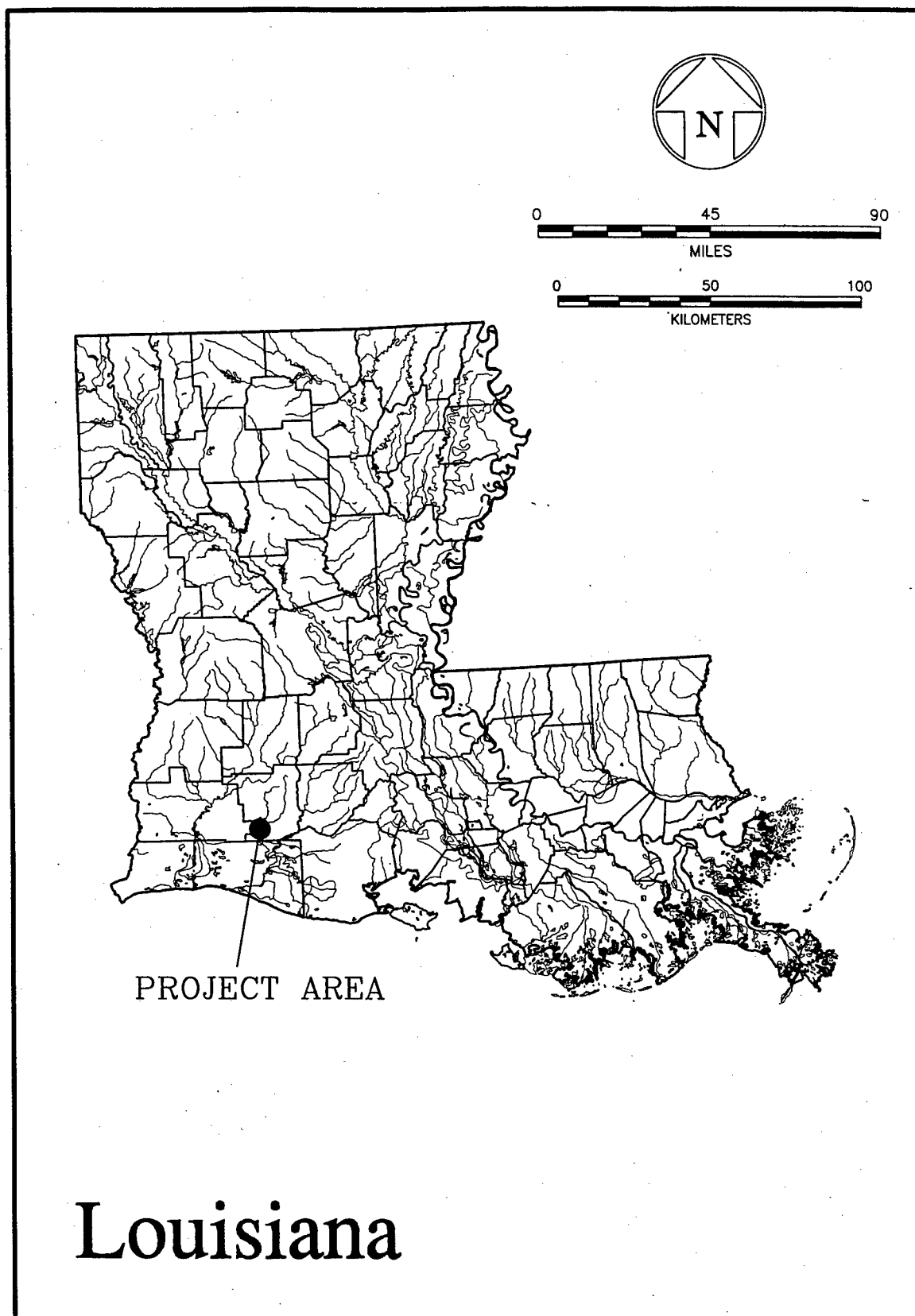


Figure 1. Calcasieu River Salt Water Barrier Repair Project Area

CHAPTER II

NATURAL SETTING

This chapter focuses on the natural setting of the U.S. Army Corps of Engineer's Calcasieu River Saltwater Barrier Project in Calcasieu Parish, Louisiana. Specifically, it involves an underwater remote sensing survey of possible submerged prehistoric and historic cultural resources along approximately 6,700 ft (2,042 m) of bankline and channel of the Calcasieu River that might be adversely affected by scheduled bankline protection repair. The project also involves the dredging of a short access channel necessary for the barge movement of protection stone.

The project is located in a river valley that has undergone significant changes in the physical landscape during the time of human presence in the region. These changes were brought about by variations in geologic and geomorphic controls and processes that, in turn, caused variations in the resulting depositional environments and landforms. To understand temporal and spatial patterns of human occupancy of the area, it is therefore essential to understand the nature of landscape contexts. This not only facilitates locating archaeological sites, but it helps in determining their state of preservation and their cultural resource significance.

The project is situated in southwestern Louisiana in the central portion of Calcasieu Parish. It lies within the corporate boundary of the City of Lake Charles; however, it is in an undeveloped area immediately west of an urbanized portion, known as Goosport. The proposed bank restoration occurs along the eastern side (left descending bank) of the Calcasieu River mostly around a sharp river bend that forms Two O'clock Point (Figure 2). Because of the low and marshy terrain and weak soils (see discussions below), the area is unoccupied; however, it has not escaped human impact during historic times. Normal river discharge has been diverted from the natural channel along the lower (downstream) part of the project reach by construction of a saltwater barrier and associated dredging of an artificial cutoff.

Geologic Setting

The project area lies in the Gulf Coastal Plain province of North America (Murray 1961) west of the section referred to as the Lower Mississippi Valley. It is a region that has been profoundly influenced by structural crustal movements (tectonics) during much of geologic time. The project area overlies the northern flank of the Gulf Coast Basin, which has been filled with thousands of meters of clastic sediments of Neogene age (DuBar et al. 1991).

All deposits of the upper part of the thick sedimentary sequence are of Quaternary age and are on the order of 787 to 1509 ft (240 to 460 m) thick in southwestern Louisiana. The vast majority of the sequence is assigned to the Pleistocene series, with only a thin veneer of Holocene sediments. All of the Quaternary deposits are fine grained and of fluvial-deltaic and marginal-marine origin.

Several series of east-west trending growth faults and the intrusion of salt diapirs (Murray 1961) have extensively affected them.

Southwestern Louisiana also has been subjected to broad, regional flexural tilting of all of the sedimentary units of Quaternary and older age. This has resulted in progressive uplift and dissection of deposits of the inner Coastal Plain and corresponding subsidence and submergence of deposits of the outer Coastal Plain, producing a gentle seaward slope on all formations with the older ones being most affected. The project area lies near the hinge line between the two types of deformation.

The structural deformation, coupled with secular eustatic sea level variations, is responsible for Pleistocene formations north of the project area being exposed as a 50- to 56-mi- (wide 80- to 90-km-wide) belt of coast-parallel terraces. Depending on definition and interpretation (Snead and McCulloh 1984; Saucier 1994), the belt contains three or four terraces, the highest and farthest inland of which is the oldest. To the south of the project area, all Pleistocene formations underlie a thin coastal belt of Holocene deposits and are in reverse sequence: the oldest of which is deepest in the sub-surface sedimentary sequence. Pleistocene deposits of the immediate project area belong to the youngest exposed terrace that was originally designated as the Prairie terrace (Fisk 1939). More recently, in light of refined mapping and morphostratigraphic correlations and a better understanding of genesis, it has been designated the Prairie complex (Snead and McCulloh 1984; Saucier and Snead 1991; Saucier 1994). The outcrop belt of the Prairie complex extends from about 12.4 mi (20 km) north of the project area to about 18.6 mi (30 km) to the south (Figure 3). Most or the entire Prairie complex of Louisiana directly correlates with the Beaumont terrace of southeast Texas (DuBar et al. 1991).

As discussed in Saucier (1994), estimates of the age of the Prairie complex have varied widely over time and among geologists, but evidence appears to be favoring a long time-interval extending from about 140,000 to about 30,000 years ago. In contrast, the surface and near surface Holocene deposits are generally believed to be no older than about 3,000 years.

Holocene deposits represent deposition during only a brief part of a single cycle of continental glaciation while the Prairie complex probably represents at least two entire cycles (Saucier 1994). Deposits of the Prairie complex within several meters of the surface in the project area are believed to have been laid down in a nearshore Gulf environment while the shallower ones probably represent either alluvium washed from higher terraces to the north or a thin prism of deltaic sediments laid down by the Red River (Saucier 1977).

General Physiographic Setting

In terms of physiography and landscape, the Prairie complex surface of the project area is generally coincident with the 'Prairies' or 'Great Southwest Prairies' natural region of Louisiana (Kniffen 1968), so-named because of the prevalent natural vegetation. South of the Prairie complex outcrop, the Holocene deposits are coincident with the 'Chenier Plain' natural region, which extends to the present Gulf of Mexico shoreline. This region is dominated by intratidal coastal marsh interrupted only by cheniers, which are relict beach ridges of the Gulf caused by advance and retreat of the shoreline (Byrne, LeRoy and Riley 1959).

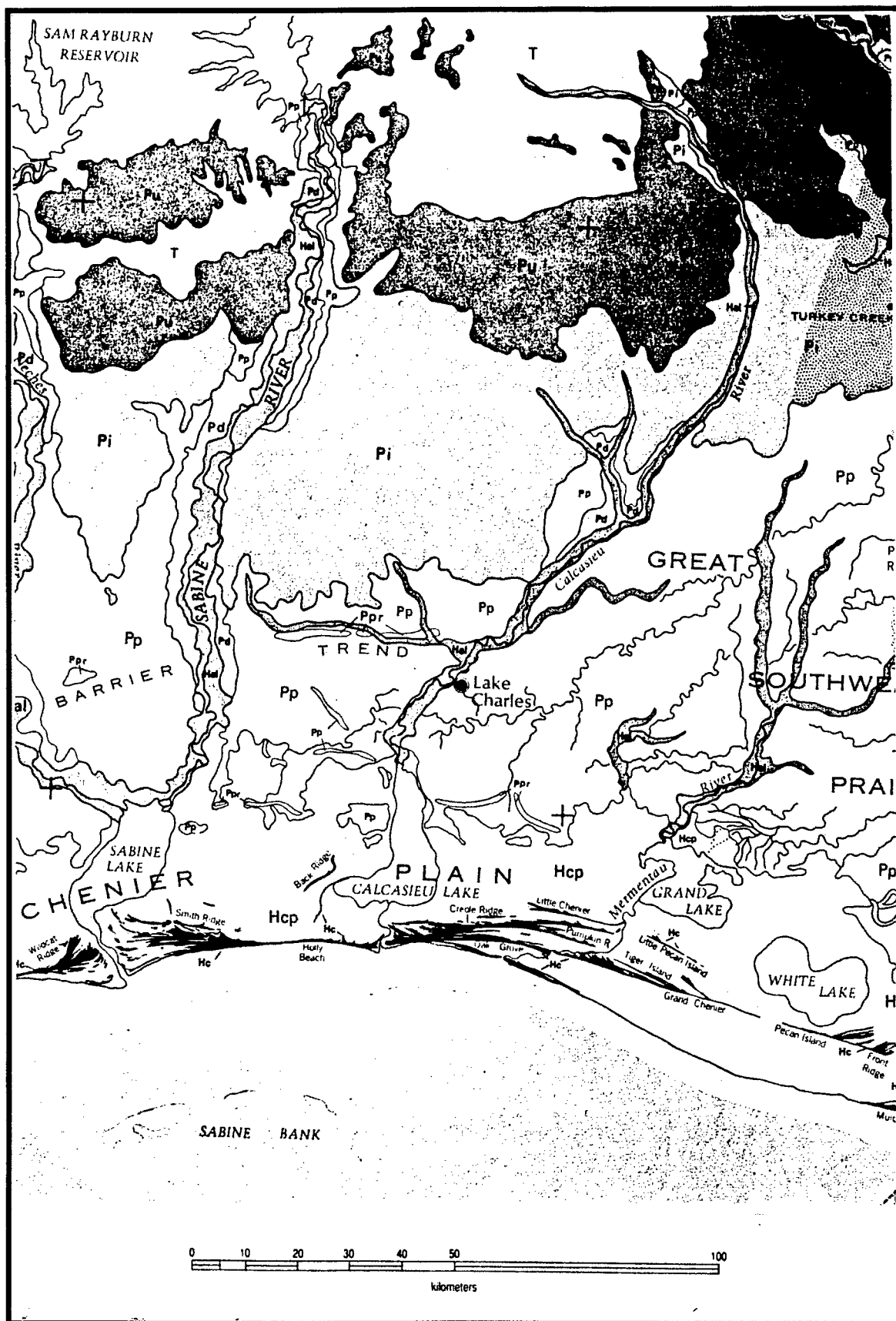


Figure 3. Map of the Quaternary deposits of southwestern Louisiana and southeastern Texas.

Hcp=Holocene Chenier plain; Pi=Intermediate complex; Pp=Prairie complex; Pu=Upland complex. From Saucier and Sned 1989

For reasons explained in the next section, the Calcasieu River and its tributaries are entrenched into the flat to slightly undulating Prairie complex surface. At Lake Charles, the entrenched river valley is about 1.5 mi (2.4 km) wide with a relatively flat alluvial floodplain surface. While the Prairie complex surface has a mean maximum elevation of slightly over 20-ft (6.0 m) above sea level (NGVD), the Holocene floodplain surface generally is below an elevation of 5.0-ft (1.5 m) above that datum. The valley margins, or 'bluffs,' hence are about 15 ft (4.5 m) high and are scalloped due to lateral erosion by the meandering river.

Within its valley, the Calcasieu River flows in a meandering pattern with a moderately high sinuosity, but geomorphologically it exhibits very few cutoff bends or other signs of active meandering. Stability of the river channel is due in large part to the cohesiveness of the deposits in its banks (discussed below), a very small bedload of silt- and sand-sized sediments, and an extremely low gradient. Although the City of Lake Charles lies about 115 km (71 mi) inland from the Gulf shoreline, it is only about 31 mi (50 km) upriver (following the natural course) from the head of Calcasieu Lake, which is connected with the Gulf. Although Calcasieu Lake only has a microtidal range (Nichol et al. 1996), tidal conditions extend upstream essentially to the project area. With the river channel having thalweg depths in the range of 30 to 50 ft (9.1 to 15.2 m), it is understandable that salt water moved upstream as far as the project area under natural conditions and even more so since the artificial dredging of the Calcasieu Ship Channel between the Gulf and Lake Charles.

Geologic Controls

Faulting and salt diapirism already have been mentioned as important geologic processes affecting the Gulf Coast Basin area. Both are present in significant numbers in southwestern Louisiana, but neither are present with a radius of about 10 km (6.2 mi) of the project location and hence neither affect its physiography (Jones et al. 1954).

Subsidence and sea level variations, two ubiquitous processes of the central Gulf Coast, are another matter. Subsidence, defined as the relative lowering of the land surface with respect to sea level, is most dominant in the Mississippi River deltaic plain, but its influence does extend into southwestern Louisiana. Geologically, subsidence involves five basic factors or natural processes (Kolb and VanLopik 1958), including: a) true or actual sea level rise; b) sinking of the basement (Paleozoic) rocks due to crustal processes; c) consolidation of the thick sedimentary sequence in the Gulf Coast Basin; d) local consolidation of near surface deposits due to desiccation and compaction; and e) tectonic activity such as faulting. True sea level rise by far has been the dominant component of subsidence in the project vicinity, augmented to some extent by factors b, c, and d, which become more important toward the Gulf shoreline and southward.

Throughout the Quaternary, world oceans experienced cyclical falls and rises in sea level due to the waxing and waning of continental glaciation. At one time, geologists recognized only four or five major eustatic cycles; however, the model is becoming progressively more detailed with perhaps as many as 13 cycles involving sea level variations of at least 100 m (328 ft) during the last 2 million years now being considered (Saucier 1994).

In Coastal Plain settings, regression of shorelines out onto continental shelves and emergence of shallow offshore areas accompanied each major fall in sea level caused by glacial expansion. At the same time, streams draining into oceanic areas (such as the Calcasieu River) extended their courses across the emerging continental shelves and became entrenched in narrow

valleys eroded into coastal plain formations. During times of glacial retreat and sea level rise, shorelines transgressed and marine environments expanded across continental shelves as they became submerged. River valleys were flooded, became estuaries, and gradually started filling with fluvial sediments.

In many Coastal Plain situations, the multiple Quaternary glacial cycles resulted in 'valleys within valleys' caused by episodes of cutting and filling. However, from a geoarchaeological perspective, only the most recent cycle and shallowest valley is of concern in the project area. The last major lowstand of sea level occurred about 20,000 to 18,000 years ago, during the Late Wisconsinan stage of the Pleistocene coincident with the maximum extent of the Laurentide ice sheet (Saucier 1994). A consensus of geological opinion places the level of the sea at that time about 120 to 130 m (394 to 426 ft) lower than at present. As a consequence, the Calcasieu River entrenched itself into Prairie complex deposits to depths of 98 to 180 ft (30 to 55 m's) between Lake Charles and the Gulf (Nichol et al. 1996) and to lesser depths along its tributaries.

Beginning about 18,000 years ago, Coastal Plain valleys were flooded as sea level rose to its present level. The character and timing of the rise, called the Holocene transgression, have been hotly debated topics for decades among Gulf Coast geologists. While details are argumentative, current opinion favors an overall rise characterized by periods of very rapid rise 1 to 2 inches (3 to 5 cm) per year separated by periods of sea-level stillstand or slow rise up to 3,000 years in length (Nichol et al. 1996). Hence, the rise curve resembles a series of irregular steps rather than a smooth plot. The time that postglacial sea level reached its approximate present level is perhaps even more disputed among geologists, with numerous estimates based on various lines of evidence from different areas. Based on his own analysis of the literature, this writer (Saucier 1994) favors a date of about 3,000 years ago for a sea level within about 3.28 ft (1 m) of its present stand, with a slow rise thereafter. Within the last several decades, the overall subsidence rate for the Calcasieu River area, of which true sea level rise is a major component, has been estimated at about 2 in/yr [0.62 cm/yr] (Nichol et al. 1992).

The sedimentary architecture and stratigraphy of the Holocene deposits filling the Calcasieu River entrenched valley in the project area are a direct reflection of the Holocene transgression. These are discussed in detail in the next section of this report.

Geomorphic Processes and Depositional Environments

In the Gulf Coast and Lower Mississippi Valley areas, geologists traditionally have described Pleistocene and older 'formations' in terms of their morphology and lithology. Because of many thousands of years of weathering and erosion, and typically sparse information on sub-surface conditions, typically it is impossible to infer the precise geomorphic processes responsible for sedimentary sequences at a particular location. Only broad, regional patterns are discernible. Thus, the Prairie complex is handled in that manner in this report. However, in Holocene deposits, because of their recent age, well-preserved surface morphology, and greater extent of sub-surface exploration, it is almost always possible to infer the precise processes at work and the particular environments in which the sediments were deposited. In this section of the report, following a classification scheme widely used for over 50 years (Fisk 1944), Holocene sediments are discussed in terms of depositional environments such as natural levee, point bar, and backswamp. It should be noted that, because of the upper estuarine/lower riverine setting of the project area, the classification is a mixture of

environments typical of alluvial valleys as well as deltaic plains. The distribution of surface environments of the project area is shown in Figure 4.

Pleistocene Prairie Complex (PPC)

Areas of the Prairie complex outcrop as a low fluvial terrace flanking both sides of the Calcasieu River valley. Indeed, the presence of the terrace, relatively immune from coastal and river flooding, must have been a major factor in the location of the settlement that grew into the City of Lake Charles. Virtually all of the commercial and urban development of the area, excluding that built on land created by dredging, is located on the terrace surface. It should be noted that Prairie complex deposits form the eastern (left descending) bank of the river for nearly 1.9 mi (3 km) below the project area, but not in the project area per se.

The deposits consist of at least 164-ft (50 m) of very stiff to hard, gray, brown, and yellow silty clays, exhibiting the effects of tens of thousands of years of desiccation and oxidation while sea level was below that of the present. Beneath the Holocene deposits of the valley, borings in the Lake Charles area indicate that Prairie complex deposits are everywhere present at a depth of 66 to 98 ft (20 to 30 m) (Nichol et al. 1996). They directly underlie an erosional unconformity that was formed during the low sea levels of the Late Wisconsin glacial stage.

Soils characteristic of the Prairie complex are mostly poorly drained and include those of the Acadia, Guyton-Messer, Kinder-Messer, and Mowata-Vidrine series (Roy and Midkiff 1988) which formed on silt loam substrates. The terrace surface is flat to slightly undulating, but is characterized by fields of numerous low, circular pimple mounds, the origin of which is subject to much debate with numerous theories of origin having been advanced (Saucier 1994). In regard to natural vegetation assemblages of the Prairie complex, this writer is not aware of a literature source on this topic per se and did not conduct extensive library research. However, extrapolating from elsewhere in the Coastal Plain, the vegetation probably consisted of expanses of prairie grasses such as big bluestem (*Andropogon gerardii*) mixed with patches of deciduous hardwoods species such as green ash (*Fraxinus pennsylvanica*), redgum (*Liquidambar styraciflua*), southern red oak (*Quercus falcata*), water oak (*Quercus nigra*), overcup oak (*Quercus lyrata*), longleaf pine (*Pinus palustris*), and loblolly pine (*Pinus taeda*). The forest species were more abundant near the terrace margins and along gullies and very small streams. Pines almost never occur naturally on Holocene deposits and their presence typically is a strong indicator of Pleistocene terraces.

Holocene Natural Levees (HNL)

Natural levees are the low, linear, alluvial ridges that flank streams that carry moderate to high-suspended loads and that periodically overtop their banks during floods. The ridges are highest near the stream channels and slope outward (distally) toward the adjacent floodbasins (backswamps). They are prism-shaped in cross section. Natural levee deposits in the project area consist of firm to stiff, mottled gray and brown, oxidized silty and sandy clays. They attain crest elevations of slightly over 5 ft (1.5 m) and are conspicuously narrow, with mostly less than 656 ft (200 m) of surface expression. Narrow and fairly steep natural levees of this type are typical of streams that experience occasional reversals in flow due to tidal influences.

No fieldwork was accomplished for this project; therefore, the natural levees were mapped indirectly based on their soils and vegetation rather than on exposed and identified natural levee deposits. As mapped by Roy and Midkiff (1988), natural levee soils of the project area are Basile and Guyton soil loams. These are described as being very poorly drained and frequently flooded. The vegetation assemblage that they support is composed of deciduous hardwoods similar to that on the Prairie complex soils; however, pines are absent and baldcypress (*Taxodium distichum*) and tupelo gum (*Nyssa sylvatica*) may be present in small numbers. In the Lake Charles vicinity, the natural levees are sometimes sufficiently well developed to accommodate small structures and even unimproved roads. This illustrates that natural levees (and only natural levees) were landforms of the Holocene floodplain that could have supported small prehistoric settlements.

Backswamp (Bs)

The backswamp environment, which characterizes a vast majority of the Calcasieu River valley in the project area, is present in floodbasin areas of the floodplain beyond the distal limits of natural levees. These are shallow basins where elevations and relief are low, drainage is very poor, inorganic sedimentation rates are very low, and organic accumulation rates are relatively high. Deposits consist of soft to very soft, gray, mostly unoxidized, watery clays and mucks with considerable organic debris. The soils of backswamp areas in the project vicinity have been mapped as Arat mucky silt loam (Roy and Midkiff 1988). In the freshest areas farthest from the river channel, the backswamp vegetation consists of stands of baldcypress and tupelo gum forest. However, most of the backswamp environment is characterized by freshwater marsh. In south Louisiana, such marshes typically consist of saw grass (*Cladium jamaicense*), roseau cane (*Phragmites communis*), cattail (*Typha* spp.), and bullrush (*Scirpus californicus*), with varying amounts of alligator grass (*Alternanthera philoxeroides*) and water hyacinth (*Eichornia crassipes*) (O'Neil 1949).

Backswamp deposits continue to accumulate in subsiding areas and/or where sea level is slowing rising, provided that they remain marginal to active sedimentation. Such is the case in the project area. Borings taken along the U.S. Hwy. 90/I-10 corridor show backswamp organic muds extending to an average depth of about 16.4 ft (5 m) (Nichol et al. 1996) (Figure 5). This implies that the river channel and other aspects of the floodplain have been extremely stable and environments have not changed for thousands of years (see next section). Near the eastern end of the corridor, about 4,920 to 6,560 ft (1,500 to 2,000 m) east of the Calcasieu River, borings show the backswamp deposits to thin to virtually nil. This is suggestive of the presence of a buried channel with flanking natural levees (abandoned meander belt), possibly trending southward beneath Lake Charles. However, there is no geomorphic evidence to substantiate this and the presence of the lake argues against it, since the lake appears to be a drowned backswamp area.

Distributary Channel Deposits

Beneath the surficial layer of backswamp deposits, the line of borings along the highway corridor indicates the presence of a buried unit of hard packed silty fine sand to medium sand ranging from 6.5 to 45.9 ft (2 to 14 m) thick (Figure 5). The deposit has been interpreted by Nichol et al. (1996) to be "broadly fluvial on the basis of its relatively coarse grain size, but it is most likely the product of distributary channel processes, active during progradation of the bayhead delta across the [underlying] upper central basin of Lake Calcasieu. The lateral continuity of the deposit indicates

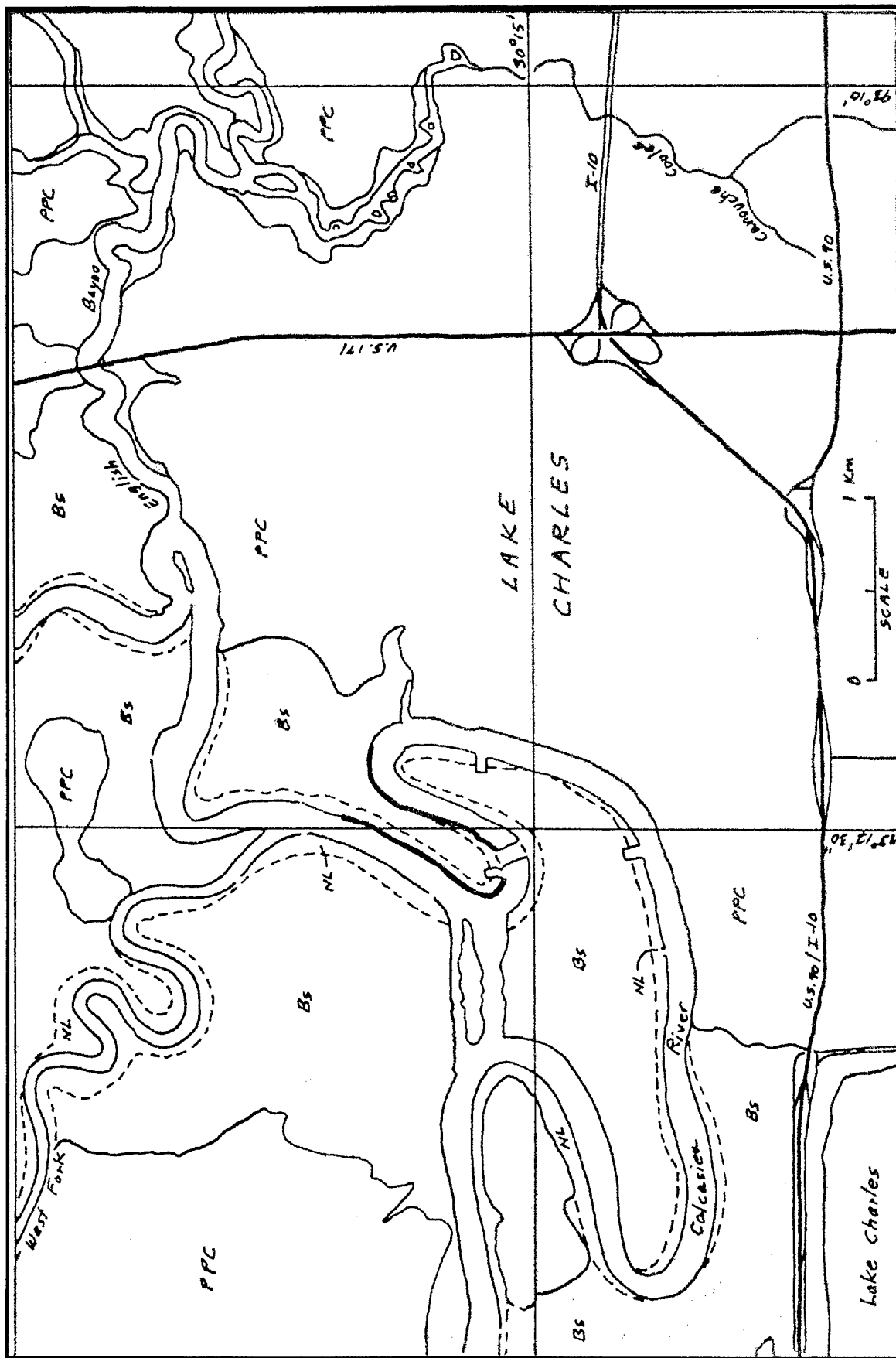


Figure 4. Distribution of Pleistocene Prairie complex and Holocene environments of deposition in the Lake Charles area. Project area is indicated by heavy line along river bank. PPC=Pleistocene Prairie complex; Bs=Holocene backswamp; NL=Holocene natural levee

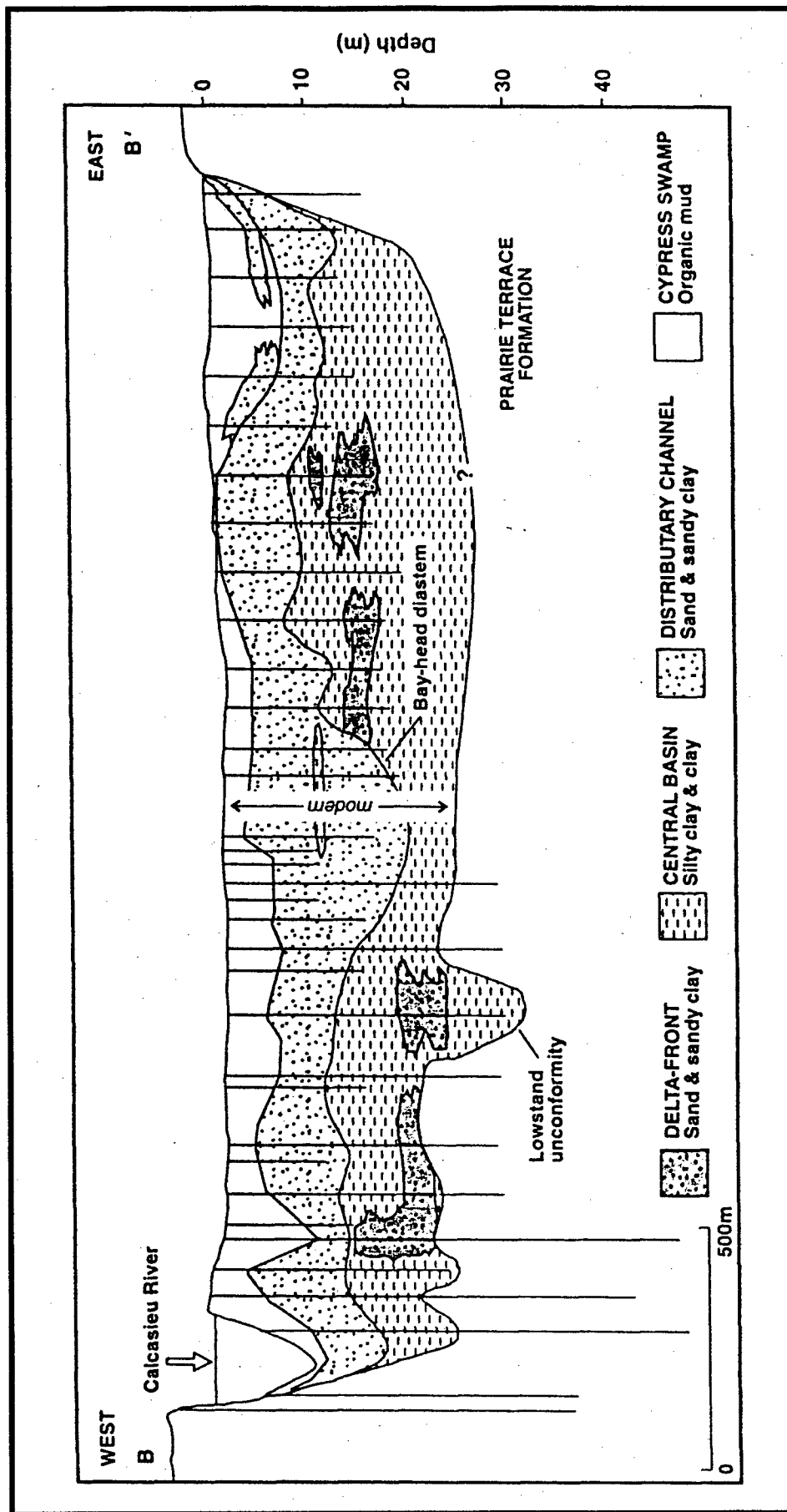


Figure 5. Geologic cross section along the U.S. 90/I-10 highway corridor across the Calcasieu River valley. For location of corridor, see Fig. 3. Modified from Nichol, Boyd and Penland 1996

extensive lateral migration of distributary channels that are inferred to have been sites for accretion of distributary mouth bars and extension of subaqueous levees."

It is beyond the scope of this report to provide a specific discussion of the sedimentary architecture and depositional environments of shallow water or bayhead delta, such as probably existed in the project area. Instead, the writer has included a popular illustration (model) of the typical distribution of major environments of a single delta lobe (Coleman and Roberts 1991) which should provide the reader with a basic understanding of the stratigraphic relations (Figure 6). While the model was intended to portray conditions in the Mississippi River deltaic plain, the basic elements are analogous to those that probably existed on a smaller scale in the lower Calcasieu River area. Note that the distributary channel unit as described by Nichol et al. (1996) probably includes the crevasse, natural levee, bay deposits, and especially the delta front deposits as identified in the delta lobe model.

Estuarine Deposits

In the highway corridor cross section, borings encountered a thick 16.4 to 32.8 ft (5 to 10 m) layer of hard clay to silty clay with isolated lenses of sandy clay (Figure 5). This unit is interpreted as a central-basin (estuarine) deposit because its texture is analogous to the modern sediments in the Lake Calcasieu basin (Nichol et al. 1996). The isolated lenses of sandy clay within the central-basin facies are interpreted as evidence for a marginal increase in depositional energy within the basin, most likely with a tidal-fluvial influence.

The estuarine deposits directly overlie the erosional (lowstand) unconformity formed in the Prairie complex deposits. Thus, the estuarine deposits are the oldest Holocene sediments (valley fill) to be laid down in the entrenched Calcasieu River valley during the Holocene sea level transgression. They represent the most marine conditions (albeit shallow marine) to have existed in the upper end of the Calcasieu estuary before riverine influences and delta growth became progressively more dominant over time.

Geologic History and Chronology

The stratigraphic correlations and depositional environment interpretations of Nichol et al. (1996) in the Calcasieu estuary were made on the basis of core descriptions, rather than the actual examination of samples, since the latter were no longer available. Therefore, none of the organic matter encountered in the borings was available for radiocarbon assay. Furthermore, to this writer's knowledge, no numerical dates of any type exist for the Holocene valley fill sequence, making the establishment of a chronology entirely a matter of speculation. The only chronologic evidence available is derived indirectly from correlations of deposit depth with inferred sea level positions, and dates on the latter are far from being established definitively.

Attempting to discern a consensus from the various Holocene transgression sea-level rise curve interpretations (Nichol et al. 1996; Penland et al. 1991), this writer offers the following very tenuous chronological scenario. From the time of the glacial-maximum sea-level lowstand about 20,000 to 18,000 years ago until about 10,000 to 8,000 years ago, sea level rose rapidly. However, because the sea level was still 98.4 ft (30 m) below that of the present, the Gulf shoreline was well out onto the continental shelf and estuarine conditions had not invaded inland as far as the project

area. During this interval, the landscape of the project area likely was characterized by an incised river channel with very little or no alluvial fill and floodplain surface.

Gulf waters first invaded the entrenched valley in the project area about 10,000 to 8,000 years ago and estuarine conditions prevailed until about 6,000 years ago. This was the time of the deposition of the central basin (estuarine) deposits described above. After about 6,000 years ago, perhaps as a result of a slowing of the rate of sea level rise or even a stillstand, river sedimentation was able to dominate. A shallow-water delta prograded into the upper estuarine area, and the distributary channel sedimentary unit began to form. During the next several thousand years, sea level resumed its post-glacial rise, no doubt causing a shifting of the locations of distributaries and some longitudinal oscillation of the delta front within the valley. Overall, however, it was a time of net aggradation.

Finally, within the proposed chronological scenario, the phase of distributary channel deposition ended about 3,000 years ago, coincident with sea level attaining its approximate present position. After that time, under a constant to very slowly rising sea level, the valley in the project area has experienced only the accumulation of backswamp deposits and natural levee development along the river channel. Relative base levels and the river gradient have not changed; thus, the floodplain has been dominantly stable with an effective balance between aggradation and subsidence.

Geoarcheological Considerations

Considering the geomorphic setting of the project area, its hypothesized chronology, and extrapolations from well-established archaeological site/landform relations of the Coastal Plain, and Mississippi River deltaic plain (as discussed in length by numerous writers such as McIntire 1958; Saucier 1963; Gagliano et al. 1982), some observations directly relevant to human settlement in the project area are possible. Emphasis is on conditions along the upper and lower (submerged) banks of the Calcasieu River, where bankline protection rehabilitation is proposed.

Prehistoric Period

The Prairie complex surface is the only landform of the project area that is old enough that there could have been habitation/exploitation at any time that humans have been present. Whether the Calcasieu valley was characterized by an incised channel, an estuary, a small delta, or a river and adjacent floodplain, its bluff margins would have been highly favorable settings for human use. Potable water would have been present in the valley in all stages and it would have contained environments with bountiful and easily exploited terrestrial and aquatic floral and faunal resources. The terrace margins were the only areas that would have remained free from both occasional riverine and coastal flooding.

The highly favorable Prairie complex surface continuously forms the valley margins; therefore, it is illogical that humans would have selected less favorable valley landscapes for anything other than small, seasonal camps or hunting and fishing stations. Supporting this view is the fact that the only known prehistoric site (16CU174) within a radius of at least 1.86 mi (3 km) of the project location is situated on the edge of the Prairie complex overlooking the river in the community of Westlake. It is a small Rangia shell midden of unknown age (as reported in state site

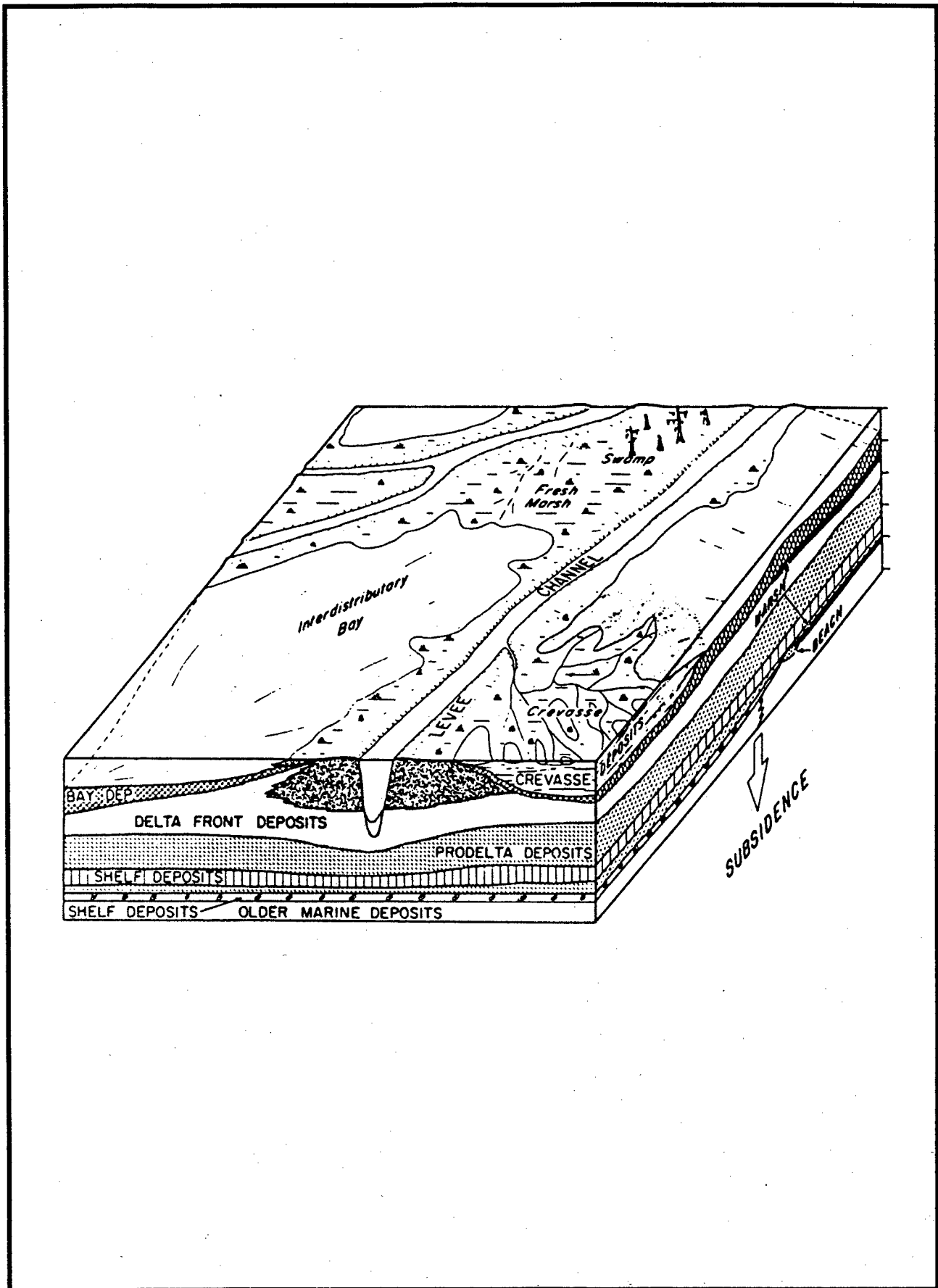


Figure 6. Typical distribution of subaerial and subaqueous environments of deposition in a delta lobe. From Coleman and Roberts 1991

files). As an aside, the presence of the brackish-water clam *Rangia* helps verify the presence of estuarine conditions in the project vicinity.

From another point of view, it is considered virtually impossible that sites older than about the Middle Archaic could exist within the valley fill since the valley was an estuarine environment until that time. From about 6,000 to 3,000 years ago, or until about the Poverty Point period, small and seasonal Archaic sites conceptually could have existed in the valley; however, the chances that they would have been preserved are extremely low because of shifting deltaic distributaries. Further, if present, the chances that such sites could be detected prior to construction is essentially nil. After about 3,000 years ago, small Formative-stage sites could have been occupied on the natural levees of the Calcasieu River. Even though the probability is very low, it is not impossible that thin lenses of midden could be encountered in the upper bank.

Historic Period

The geomorphology of the project vicinity suggests that any sunken vessels that may be present will be exposed on the river bottom or along its underwater banks and should be rather easily detected by remote sensing. There is sufficient river discharge and/or scour from tidal currents to preclude sunken vessels from being completely buried by recent channel deposits, and there is no reason to suspect the presence of progressive channel shoaling. In addition, there is no geomorphic evidence to indicate any significant amount of progressive lateral channel shifting and accumulation of point bar (lateral accretion) deposits. This would appear to preclude the possibility of sunken vessels being buried in the riverbanks from that particular process.

Climate

Summers are long, hot and humid within this portion of Louisiana. Because of the dominance by warm, moist maritime air masses originating from the Gulf of Mexico, this weather typically lasts from May through September. According to records at Baton Rouge Municipal Airport for the period 1931 to 1960, July and August are the hottest summer months, with an average daily maximum temperature of 91° F (32.78° C) and an average daily minimum temperature of 72° F (22.22° C). Thunderstorms are the primary cause of precipitation during the summer. Precipitation occurs either as brief heavy showers or as gentle rains. June is the second driest month of the year, with an average monthly precipitation rate of 4.1 in (10.4 cm). During late summer, infrequent tropical storms and hurricanes are a source of heavy rain and gentle showers (Dance et al. 1968; Schumacher et al. 1988).

Fall generally lasts from late September to early November. Typical fall weather consists of humid, mild, and sunny days interrupted by infrequent cold fronts. Each cold front brings a brief spell of cooler and drier weather. During the fall, precipitation results both from the infrequent squall lines associated with fronts, and from the occasional tropical storm or hurricane. October is the driest month of the year, with an average monthly precipitation rate of 2.5 in (6.4 cm) (Dance et al. 1968; Schumacher et al. 1988).

Winter generally lasts from the middle of November to the end of February. Winters usually are mild, with an average of only 16 days each year having a minimum temperature of 32° F (0° C) or lower. January is the coldest month with an average daily maximum temperature of 63° F (17.22°

C) and an average daily minimum temperature of 42° F (5.56° C). Typically, moist tropical air from the south alternates with dry, polar air from the north. Extremely cold weather seldom lasts more than three to four days in a row. During the winter, precipitation is associated with cold fronts. Infrequently, these fronts will stall in the Baton Rouge area and will cause prolonged rains. Snow is uncommon; an inch or two may fall in some years during February (Dance et al. 1968; Schumacher et al. 1988).

Spring generally lasts from the end of February to the beginning of May. During this period, the frequency and duration of incoming cold fronts decreases sharply. Rainfall during the spring is associated with cold and warm fronts. The monthly average rainfall is a relatively constant 4.8 in (12.1 cm) for each spring month (Dance et al. 1968).

CHAPTER III

PREHISTORIC CULTURAL SETTING

The currently proposed Calcasieu River project area is confined to the Gulf Coastal Plain. This region of prairie terraces is characterized by meandering rivers that serve as a buffer between swampy lowlands to the south and piney woods to the north. The proposed project area is located within the vicinity of Calcasieu River Mile 43, Calcasieu Parish, Louisiana. Calcasieu Parish is situated within Management Unit III as defined by *Louisiana's Comprehensive Archaeological Plan* (Smith et al. 1983).

The prehistory of Management Unit III extends from circa (ca.) 12,000 B.C. - A.D. 1700 and it can be divided into four general archeological stages. These four stages (Paleo-Indian, Archaic, Woodland, and Mississippian) are developmental segments characterized by dominant patterns of subsistence and technology (Kreiger 1953; Willey and Phillips 1958). Each stage consists of a sequence of chronologically defined periods, which may be sub-divided into phases based on sets of artifacts and other cultural traits characteristic of a particular geographic region (e.g., Jenkins 1979; Walthall 1980). While different systems have been used over the years to organize and describe the culture history of the region (e.g., the Paleo-Indian, Meso-Indian, and Neo-Indian eras used by Neuman 1984), the syncretic stage-period-phase system described by Willey and Phillips (1958) will be utilized in the discussion presented below. In recent years, eight cultural units have been used to describe the prehistoric sequence of this management unit: Paleo-Indian, Archaic, Poverty Point, Tchefuncte, Marksville, Troyville-Coles Creek, Plaquemine, and Mississippian (Smith et al. 1983). However, more recent research (Kidder 1988) suggests that Plaquemine culture actually is a variant phase of the Emergent Mississippian period; it will be discussed as such. This chapter addresses each of these units, as well as the Protohistoric period prior to 1700.

Paleo-Indian Stage (ca. 10,000 – 8,000 B.C.)

Paleo-Indian occupation of the southeastern United States generally is believed to have occurred sometime between 10,000 and 12,000 years ago (8,000 - 10,000 B.C.). Paleo-Indian sites are characterized by a distinctive assemblage of lithic tools that includes fluted and unfluted lanceolate projectile points/knives, unifacial end and side scrapers, graters, and spokeshaves. Paleo-Indian lithic technology displays a high level of workmanship, and chipped stone artifacts of the period exhibit fine flaking, edge grinding, retouching, and basal thinning (Neuman 1984; Smith et al. 1983).

The earliest Paleo-Indian culture identified in North America has been named "Clovis," after the type-site identified in the Southwestern United States. In the western United States, Clovis sites appear to fall within a relatively narrow time range, i.e., between 10,900 and 11,500 years ago (Haynes 1991; Story et al. 1990:178). While the evidence for earlier "pre-Clovis" or "pre-projectile

point" occupations continues to be debated, no earlier sites have been documented convincingly in North America.

The lithic tool assemblage of the Clovis culture, and the related Folsom culture of the Great Plains and Southern Plains, generally is referred to as the Llano complex. The smaller, fluted Folsom and unfluted Midland projectile points/knives once were thought to postdate Clovis; however, accepted radiocarbon dating of numerous Folsom components in Texas produced dates ranging from ca. 8,000 to 9,000 B.C. (Largent et al. 1991:323-332; Story et al. 1990:189). These dates suggest that Folsom culture may be partially contemporaneous with Clovis culture.

The Plano complex represents a similar tradition in the Southern Plains. In East Texas and Louisiana, unfluted lanceolate Plainview, Firstview, Hell Gap, and Angostura projectile points/knives represent this complex. These types first were thought to be unfluted variants of the Clovis type, but radiocarbon dating suggests a later temporal placement. Current data place the Plano complex from 6,000 to 8,100 B.C. (Turner and Hester 1985:66, 141). Plano-type artifacts have been found throughout Louisiana (e.g., Cantley and Kern 1984; Hillman 1990:206-207). Gagliano (1963:12) recovered a single Plainview projectile point/knife from Jones Creek (Palmer Site - 16EBR26) near Baton Rouge.

Another Paleo-Indian tradition identified in North America is the Cody complex. This assemblage includes the stemmed lanceolate Scottsbluff and Eden projectile points/knives. Cody complex bifacial tools usually are identifiable by the presence of fine comedial pressure flaking. The uplands in the Texarkana region of northwest Louisiana, northeast Texas, and southern Arkansas have produced relatively large numbers of Cody Complex artifacts (Gagliano and Gregory 1965:62-77; Story et al. 1990:209), but the associated radiocarbon (^{14}C) dates have not been conclusive. These ^{14}C dates range from 7,100 to 8,200 B.C. (Story et al. 1990:209), although Turner and Hester (1985:149) place the Scottsbluff projectile point/knife at ca. 6,650 – 7,120 B.C.

Paleo-Indian peoples are thought to have been highly mobile hunter-gatherers, organized in small bands or extended family groups. The formerly prevalent notion that the Paleo-Indian populations were represented by specialized big game hunters seems less tenable as information becomes available from a more inclusive set of Paleo-Indian sites. While sufficient evidence exists for the exploitation of large mammals (mega-fauna) including mammoth, mastodon, bison, caribou, and elk at sites in the western and northern United States, kill sites are rare in the Southeast. The occurrence of Clovis-like fluted projectile points/knives in the southeastern United States is thought to reflect contemporaneity with a culture similar to the Clovis sites recorded in the western and northern parts of the country. Whether or not this suggests that big game hunting was a dominant adaptive strategy in the Southeast is less certain because of the regional environmental differences associated with the availability of the big game species. For example, excavations at the Kimmswick site in southeastern Missouri produced Clovis projectile points in direct association with disarticulated mastodon bones, suggesting that Southeastern Paleo-Indian populations did exploit large Pleistocene mammals at least occasionally (Graham et al. 1981). In contrast, two sites in south central Louisiana (Avery Island and the Trappey Mastodon Site in Lafayette) produced the remains of Pleistocene fauna, but failed to provide a Paleo-Indian relationship (Neuman 1984).

Although there is little data upon which to base a dietary reconstruction, Paleo-Indian subsistence throughout the Southeast, including the vicinity of the current project area, is believed to have encompassed a broad spectrum of resources, including fish, fowl, deer, small mammals, nuts, and gathered plants (Smith 1986:9-10; Steponaitis 1986:369; Walthall 1980:36). The sole exception

could possibly be the Folsom culture. Folsom artifacts have been associated consistently with bison kill sites on the Great Plains. The lack of faunal evidence in association with Folsom finds in east Texas and Louisiana, due mainly to the highly acidic nature of the soils and the moist climate, precludes insight into the subsistence strategies of the area. Indications are that the Folsom culture could represent an adaptation to a specialized hunting strategy associated with the cyclical migration of large herds of bison (Story et al. 1990:189).

Most of the archeological evidence associated with the Paleo-Indian occupation of the southeastern region is limited to surface finds of diagnostic projectile points/knives (Mason 1962). In the Lower Mississippi Valley, Paleo-Indian projectile points/knives have been recovered along valley margins but rarely in the alluvial valley or along the coastal plain, and distributional studies indicate that Paleo-Indian sites in the eastern United States tend to be located on eroded terrace and plateau surfaces (Walthall 1980). Paleo-Indian and Early Archaic presence in the Lower Mississippi Valley is best documented from Macon Ridge. Macon Ridge is a relict Pleistocene braid plain in Northeast Louisiana that until recently was not known to contain sites older than the Late Archaic period (Saucier 1981). Hillman (1990) collected information concerning 121 sites on the Macon Ridge from which over a thousand Paleo-Indian and "epipaleoindian" projectile points/knives have been collected, including 272 Dalton-Meserve, 39 Hardin, and over 400 San Patrice types. He concluded that Early and Middle Paleo-Indian occupation of Macon Ridge apparently was sporadic or seasonal, possibly reflecting the somewhat inhospitable conditions caused by the excessive accumulation of wind-blown dust across open grasslands during the formation of the loess hills.

The distribution of recorded sites suggests that Macon Ridge was occupied more intensely during the Late Paleo-Indian and Early Archaic periods. However, during the Late Paleo-Indian period, hunting camps and base camps normally were located very close to streams, ponds, or sloughs, on landforms generally no more than 1 m (3.3 ft) above the water source, even when higher elevations or ridges were located in the immediate vicinity. This preferential use of the area adjacent to the waterways may reflect the intensive use of the wooded fringes situated along the waterways rather than the exploration of the open grasslands. By the Early Archaic, settlement shifted to the higher elevations, possibly reflecting an environmental transformation of Macon Ridge from open grasslands to open woodlands (Hillman 1990).

Brain (1983) states that Paleo-Indian projectile points/knives have been found along relict channels of the Mississippi River and remnant Pleistocene surfaces in the floodplain that pre-date ca. 7,000 B.C. In Louisiana, Paleo-Indian sites have been found along Tertiary upland ridges and uplands/floodplain bluffs (Guy and Gunn 1983). Projectile points/knives such as Clovis, Folsom, Scottsbluff, Plainview, and Meserve have been found on the surface of these sites. The majority of these projectile points/knives have been found in northern Louisiana; only a very few have been found on late Pleistocene age Prairie Terrace deposits in the southern part of the state.

The previously mentioned Avery Island Site, situated near Banana Bayou, is the only substantial Early Paleo-Indian site that has been identified in Management Unit III. It is located on the Avery Island salt dome, near the coast of central Louisiana. Although the site produced the remains of Pleistocene fauna intermingled with and/or above lithic artifacts and basketry remains, no diagnostic artifacts were recovered from this component (Neuman 1984; Gagliano 1970). Subsequently, the relationship of the faunal remains to the artifacts is unclear.

From the Late Paleo-Indian Period, two cultural phases (the Strohe phase and the Vatican phase) have been suggested in the general region encompassing the proposed project area (Ryan et al.

1996). Little is known about the Vatican phase in south central Louisiana, but the Strohe phase of southwest Louisiana is better documented. This phase was defined by Bonnin and Weinstein (1975, 1978) following the identification of a Dalton-like projectile point type that was recovered during excavation of the multi-component Strohe Site (16JD10) in Jefferson Davis Parish.

In the original publication of *Louisiana's Comprehensive Archaeological Plan*, and based on records obtained from the Division of Archaeology, a total of only four Paleolithic sites/components were documented for Management Unit III (Smith et al. 1983:63). Of these, two are located in Acadia and Evangeline parishes; while the remaining two sites are located in St. Landry and Iberia parishes. The Jefferson Davis Parish component recorded at the Strohe Site (16JD10) was not included in the 1983 publication, nor were two other possible Paleo-Indian components that have been identified at separate multicomponent sites (16AL1 and 16AL36) in Allen Parish.

Archaic Stage (ca. 8,000 – 1,200 B.C.)

The term "Archaic" first was coined in the second quarter of the twentieth century as a descriptor for the pre-ceramic cultures that followed the Paleo-Indian Stage. Environmental pressures, a warming trend, and a drier climate at the end of the Pleistocene accompanied by a rise in sea level, resulted in a combination of technological and social developments (Willey and Phillips 1958). Although evidence compiled by Dumont (1981) suggests that there was a degree of continuity between the adaptations of the prehistoric peoples of the late Pleistocene northern pine/hardwood forests and those who lived in the initial deciduous, Gulf coastal plain forests of the region, an economic shift probably resulted in highly diverse localized resource and food procurement strategies (Haag 1971). Caldwell (1958) termed this hunting and gathering specialization as "maximum forest efficiency;" Brain (1971) modified this phrase to "maximum riverine efficiency" in reference to southeastern riverine and coastal communities. Archaic peoples often moved on a seasonal basis to exploit a home range defined by the availability of nuts, fruits, fish, game, shell fish, and other natural resources (Muller 1978).

The increased number of sites dating from the Archaic Stage suggests an increase in population throughout the area; *Louisiana's Comprehensive Archaeological Plan* lists 40 sites from this period for Management Unit III, versus only four sites dating from the Paleo-Indian Period (Smith et al. 1986).

Archaic societies operated on a system of fission and fusion. Macrobands formed during the spring and summer months, while in the winter months, smaller microbands exploited upland ranges (Muller 1978). Archaic populations apparently exploited a greater variety of terrestrial and marine species than their Paleo-Indian predecessors did. Many populations with successful strategies during the Archaic sequence went on to develop the first quasi-permanent settlements (Neitzel and Perry 1977).

The Paleo-Indian to Archaic Stage transition was accompanied by a change in projectile point/knife morphology. These changes included the emergence of a wide variety of notched and stemmed projectile point/knife forms and the disappearance of the fluted projectile point/knife type. Nevertheless, evidence suggests that there was some continuity between the adaptations of the Paleo-Indian and the later Archaic peoples who occupied the deciduous forests of the region (Smith 1986). Archaic projectile point/knife sequences follow a general trend in haft morphology that progresses from side notched to corner notched to stemmed basal forms. These forms, though, are not mutually

exclusive. Other Archaic Stage flaked artifact types included adzes, scrapers, and choppers. During the latter half of the Archaic Stage granitic rock, chert, jasper, sandstone, slate, steatite, and scoria were ground and polished into a variety of stone ornaments and tools, which included beads, gorgets, bowls, and celts/axes. Burial sites dating from the Archaic also have been found at numerous sites (Neuman 1984; Walthall 1980), suggesting that religion, or some form of belief system, was recognized. The Archaic Stage can be divided into three subdivisions or periods: Early Archaic, Middle Archaic, and Late Archaic.

Early Archaic Period

In the Southeast, the Early Archaic period generally begins between 6,000 and 8,000 B.C., but because of regional variation and temporal overlapping of stages, the assignment of late Paleo-Indian and Early Archaic period artifacts to correct temporal stages can be confusing. Dalton projectile points/knives are the temporal successors of Clovis projectile points and have been dated between 8,500 and 7,900 B.C. in Arkansas and Missouri (Goodyear 1982:382). At the Stanfield-Worley Bluff Shelter in northwestern Alabama, the Dalton horizon dates from somewhat later, between 7,700 and 7,000 B.C. (DeJarnette et al. 1962; Griffin 1974). Dalton projectile points have been found in association with Kirk Notched, LeCroy, Rice Stemmed, and Graham Cave projectile points/knives in Horizon 11 at the Koster site, which dates from 6,700 to 6,450 B.C. This evidence suggests that Dalton points/knives may extend later in time than initially thought.

On occasion, Dalton projectile points/knives have been accompanied by bifacially chipped stone adzes that may represent woodworking tools. Chipped and ground stone celts, probably the functional equivalent of Dalton adzes, have been recovered from the Kirk Horizon in Zone 16 at the St. Albans Site (46KA27) and from Early Archaic sites in the Little Tennessee River Valley (Smith 1986:14; Kimball 1996). Based on the archeological record, the presence of Dalton projectile points/knives in southwest Louisiana is expected to be limited, and of these, many probably have been reworked by temporal/cultural successors. Artifacts associated with the Dalton culture usually are restricted to the northern portion of the state.

Some of the earliest recognized Terminal Paleo/Early Archaic projectile point/knife types identified in Louisiana are the San Patrice, Keithville, and Pelican forms (Webb et al. 1971). Previously ascribed to the area encompassing northwest Louisiana, northeast Texas, and southwest Arkansas, later investigations have extended the geographic range of San Patrice to include an area from central Texas to southwest Alabama, and from southern Louisiana to central Arkansas (Brain 1983:32; Cantley and Kern 1984; Giliberti 1995:personal communication).

The San Patrice culture represents an adaptation of hunters/gatherers to the resources of a more restricted area. The hallmark of the San Patrice is the almost exclusive use of local lithic materials for the production of tools. Tool assemblages include San Patrice *var. Hope* and St. John projectile points/knives, hafted scrapers, Albany side scrapers, unifacial scrapers, burins, and engravers (Webb et al. 1971). More recently, Keithville *var. A and B*, San Patrice *var. Geneill*, and New River projectile point/knife types have been added to the assemblage (Brain 1983; Giliberti 1995:personal communication). Reliable ¹⁴C dates for these types are virtually unknown, but estimates, based on morphology and stratigraphic placement, range from ca. 8,000 to 5,000 B.C. (Brain 1983:25; Story et al. 1990:202; Turner and Hester 1985:147; Webb 1981). Ensor (1986) suggests that the San Patrice projectile point/knife type, and related forms in the Southeast, may have developed from the earlier Dalton projectile point/knife forms. Story (1990:197), however, thinks

that both Dalton and San Patrice types evolved from the earlier fluted point traditions. Excavations by the Regional Archaeology Program, undertaken at the Lyles Site (16AL36), indicated a possible intact San Patrice component, and McGimsey (1996) recommended additional testing of the site. The results of these excavations on Barnes Creek in Allen Parish, indicate that there is an Early Archaic presence in the Calcasieu River drainage.

Throughout the Early Archaic, the subsistence pattern probably resembled that of the preceding Paleo-Indian Stage. Early Archaic peoples traveled seasonally in small groups between a series of base camps and extractive sites, hunting deer and collecting acorns and nuts (Chapman and Shea 1981; Lentz 1986; Parmalee 1962; Parmalee et al. 1976).

Tools associated with food processing, including manos, milling stones, and nutting stones, are first recovered from Early Archaic period sites. Commonly utilized plant foods, such as walnuts, hickory nuts, and white oak acorns could be hulled and eaten without cooking or additional processing (Larson 1980). Herbaceous seeds, which became an important food source later in the Archaic Stage, generally were absent during the Early Archaic (Chapman 1977; Lentz 1986). While living floors associated with hearths, shallow pit features, and milling tools are known from the Early and Middle Archaic, there is little evidence suggestive of below-ground food storage or of substantial structures (Steponaitis 1986:371).

Much of our knowledge regarding Paleo-Indian and Archaic lifeways is limited by problems of preservation. Lithic tools often are the only artifacts to survive, but they provide only limited information about a narrow range of activities (i.e., manufacture and maintenance of tools, processing of meat and hides, and working of wood and bone). Although they rarely are preserved in the archeological record, clothing, baskets, and other artifacts made of perishable materials such as bone, wood, antler, shell, hair, hide, plant fiber, and feathers were no doubt an important part of the Archaic cultural tradition. Impressions of woven mats and net bags preserved in fired clay hearths from Kirk strata at the Icehouse Bottom Site (40MR23) in eastern Tennessee provide rare insight into the richness of the Early Archaic material culture (Chapman and Adovasio 1977; Kimball 1996).

The Early Archaic cultures immediately preceding San Patrice are little understood in Louisiana. So far, diagnostic projectile points/knives dating from the Early Archaic period, including Cache River, Calf Creek, Kirk, and Palmer only have been recovered from questionable contexts and in limited numbers. The large Early Archaic sites, such as those identified in Florida, Georgia, Alabama, Tennessee, and the Carolinas, have yet to be recorded. Gagliano's (1963:12) survey of "preceramic" sites in southern Louisiana found that Kirk Serrated projectile points/knives were not uncommon for the southeastern portion of the state, however, no cultural phases have been assigned to either the central or western portions of the state.

Middle Archaic Period

Three interrelated events shaped Middle Archaic cultures. First, the effects of continental glaciation subsided, resulting in a warmer and drier climate. Sometime prior to 1,000 B.C., modern climatic and environmental conditions prevailed. Second, sociopolitical organization changed in some areas; an increased emphasis on ranked societies resulted in an increase in territorialism and in regional diversification. Finally, technological improvements occurred, particularly with respect to groundstone, bone, and antler implements.

This period is typified by the Morrow Mountain Horizon. Small to medium-sized, triangular projectile points/knives with short tapered stems characterize the Morrow Mountain Horizon. Morrow Mountain forms are distributed widely; they have been recovered from the eastern seaboard to as far west as Nevada, and from near the Gulf of Mexico to as far north as New England (Walthall 1980). In Louisiana, the Middle Archaic is represented by projectile points/knives that include Morrow Mountain, Johnson, Edgewood, and possibly Calcasieu types (Campbell et al. 1990:96; Green 1991; Perino 1985:195). Excavations at Site 16VN791 in Vernon Parish, Louisiana, i.e., north of the proposed project area in Management Unit I, produced evidence of a long tradition of corner notched projectile points/knives dating from in the late Middle Archaic. It has been suggested that these points, and others in the region, were derived from types incipient to central Louisiana (Campbell et al. 1990). Only one Middle Archaic Period phase currently is recognized in coastal Louisiana. The Banana Bayou phase in the Petit Anse region in the central part of the coast, is represented by the artifact assemblage observed by Gagliano at Avery Island, near Banana Bayou (Neuman 1984).

Late Archaic Period

For most of eastern North America, the Late Archaic represents the first cultural adaptation to an essentially modern environment. By 4,000 years ago, the current bay tree-bald cypress, southern pine, southern pine-bald cypress, and oak-southern pine forests were established along both the Gulf and Atlantic Coastal plains (Delcourt and Delcourt 1981). The population structure and boundaries of those forest communities may have varied as a result of subsequent climatic changes, but they remained similar to their modern counterparts.

Evidence shows that the shorelines along the Atlantic and the Gulf still were stabilizing from 3,000 to 1,000 B.C.; based upon the distribution of occupation surfaces of Late Archaic sites in those areas, sea levels generally were 1 to 2 m (3.3 to 6.6 ft) below present levels (DePratter and Howard 1980; Griffin and Smith 1954). DePratter and Howard (1980:33-34) also note that coastal conditions in many areas were not conducive to the development of oyster beds until Late Archaic times. Oyster beds and related resources, especially fish, were a significant factor in the structure of Late Archaic settlement along the Atlantic and eastern Gulf coasts. Many Late Archaic sites were associated with lower estuaries and upper bays, reflecting a subsistence regime that focused on the use of fish and shellfish. Furthermore, DePratter and Howard (1980:7) list three Late Archaic site types along the Atlantic Coast: circular shell rings/mounds, linear shell middens, and non-shell sites.

The Late Archaic period represents a time of population growth, evidenced by an increasing number of sites found throughout the United States. Stone vessels made from steatite, occasional fiber-tempered pottery, and groundstone artifacts characterize the Late Archaic. Late Archaic projectile point/knife types found throughout Louisiana include corner notched and stemmed forms.

In the eastern United States, the Late Archaic economy focused on a few resources, including deer, mussels, and nuts. Jenkins (1979) recognized a seasonal procurement strategy in place in Middle Tennessee during the Late Archaic. During the spring, macrobands formed to exploit forested riverine areas. Archeological investigations of Late Archaic shell middens and mounds indicate a reliance on shellfish, fish, and riverine fauna and flora. During late fall and winter, Late Archaic peoples split into microbands and subsisted on harvested and stored nut foods and faunal species commonly found in the upland areas.

During this period, the midsouth also witnessed the beginnings of indigenous plant domestication, based on a group of cultigens known as the Eastern Agricultural Complex. Although not found in the vicinity of the project area, the remains of domesticated squash, gourds and sunflower have been recovered from parts of Kentucky, Tennessee, north Alabama, and other regions of the midsouth. While domesticated plants often imply the existence of a more sedentary lifestyle, the seasonal exploitation of resources was still an important element of the Late Archaic subsistence system. Finally, the latter part of the Archaic marked the beginning of trade networks inferred from the presence of exotic items such as those recovered from the burials at the Indian Knoll site in Kentucky (Muller 1986).

Sites associated with this cultural period typically are found along the boundary of Quaternary and Tertiary areas with relatively flat or undulating bluff tops that overlook the floodplains. Within the region, Late Archaic sites appear on the Prairie terraces and relict levees (Gagliano 1963). Archaic style projectile points/knives commonly are found throughout the state; however, few of Louisiana's discrete, intact archeological deposits dating from the Archaic have been excavated systematically, analyzed, and comprehensively reported (Neuman 1984). Those few sites that have been carefully studied in the west-central and northern part of the state, have yielded projectile points/knives that include Gary, Kent, Palmillas, Carrollton, Marcos, Bulverde, Ensor, Ellis, Epps, Macon, Yarbrough, Motley, Pontchartrain, Delhi, and Sinner types. Groundstone objects recovered from these sites include celts/axes, plummets, and steatite bowl fragments (Campbell et al. 1990; Smith 1975).

A total of three Late Archaic cultural phases, the generally contemporaneous Pearl River, Copell, and Bayou Blue phases, have been identified for coastal Louisiana. The Pearl River phase is found in the eastern part of the state and frequently is associated with either fresh or brackish water shell middens. The Copell phase has been identified in the Petit Anse region, i.e., in south central Louisiana. In southwest Louisiana the Bayou Blue Site (16AL1), the Late Archaic type-site for the Bayou Blue phase, is an earthen midden situated on a natural levee that overlooks a relict channel of Bayou Blue in Allen Parish. Artifacts recovered from this site include projectile points/knives and lithic debitage that underlie a later, Marksville Period occupation.

Poverty Point Culture (ca. 1,500 - 500 B.C.)

Poverty Point represents a transitional culture that originated ca. 2,000 B.C., but did not realize its full potential until much later. As a result, the Poverty Point sphere of influence did not arrive in south central Louisiana, southwest Louisiana, or east Texas until ca. 1,500 B.C. (Gibson 1994, 1979; Neuman 1984; Pertula and Bruseh 1994). The culture is best represented at the type site (16WC5) in northeast Louisiana. The site is situated adjacent to Bayou Macon and near several major rivers, including the Mississippi, Tensas, Ouachita, and Boeuf. This riverine location was ideal for exploiting the flow of trade goods from other regions (Jeter and Jackson 1990:142; Muller 1978; Neitzel and Perry 1977) and for cultural diffusion. Evidence of long distance trade at Poverty Point includes ceramics from the St. Johns River region of Florida and lithic materials from deposits in Arkansas, Illinois, Indiana, Missouri, Ohio, Oklahoma, and Tennessee (Connaway et al. 1977:106-119; Gibson 1974:26, 1979, 1994; Jeter and Jackson 1990; Lehmann 1982:11-18; Webb 1982:13-14). By convention, Poverty Point culture has been thought to represent the first chiefdom-level society to develop in the eastern United States (Gibson 1985a; Muller 1978), however, Jackson (1991) has moved away from this proposition, stating that the exact nature of this culture is still unknown.

The Poverty Point site (16WC5) is distinguished primarily by its large earthworks and its complex microlithic industry. The earthworks include six segmented ridges, 15 to 46 m (50 to 150 ft) wide, that form five sides of an octagon, and several other Poverty Point mounds scattered throughout the immediate site area. The largest mound, Mound A, may be a large bird effigy (Webb 1982). At the time of its construction, Poverty Point was the largest earthwork in the Americas.

Materials identified at Site 16WC5 and associated with Poverty Point culture include the atlatl, plummets, beads and pendants, thin micro flints/blades, clay cooking balls and objects (figurines/fetishes), as well as both food storage and preparation containers. Container types consisted of steatite vessels, evidence of baskets and basketry, and untempered ceramic material; most ceramic vessels were tempered primarily with sand, although a minority of grit tempered, clay tempered, and fiber-tempered ceramic and vessels, as well as untempered sherds, have been recovered. Webb (1982) also reported the recovery of seed processing implements, polished stone hoe blades, nutting stones, and milling stones. Earthen ovens also have been identified.

Little is known of the general everyday lifestyles of the people of this culture, and subsistence information is limited to the knowledge that Archaic hunting and gathering activities still were practiced by Poverty Point people. Thus far, and despite the recovery of seed remains and processing instruments (Connaway et al. 1977, Thomas and Campbell 1978, and Webb 1982) no evidence of maize or any other cultigens exists to indicate that agriculture was practiced by these peoples.

Brain (1971) perceives Poverty Point as a bottomland occurrence, while Webb (1982) suggests that Poverty Point sites typically are found in four locations. These areas include the Quaternary terraces or older land masses that overlook major stream courses, major river levees along active or relict river channels, river-lake junctions, and coastal estuaries or older land surfaces located within a coastal marsh area. Poverty Point sites appear to be located in areas ideal for exploiting forest-edge resources and for transporting exotic materials. Sites range in size from large ceremonial centers to more frequently identified hamlets or foraging stations.

In southeast Louisiana, small shell middens located along the shoreline of Lake Pontchartrain exhibit Poverty Point traits and suggest seasonal and specialized adaptations to marsh environments. These sites represent two phases of Poverty Point culture: the Bayou Jasmine phase and the Garcia phase. Bayou Jasmine phase sites are located on the western shore of the lake as well as along the natural levee ridges of the Mississippi River distributaries. Garcia phase sites are located along the eastern shore of Lake Pontchartrain. The Garcia Site (16OR34), the type site for the Garcia phase, was found to contain a beach deposit of *Rangia* shells and midden debris. Radiocarbon dates from Bayou Jasmine phase components cluster around 3450 B.P., while Garcia phase sites date about 1000 years later (Gagliano 1963; Gagliano and Saucier 1963). Bayou Jasmine phase sites, such as the type site located along the western shore of the lake exhibit Poverty Point traits exclusively (Duhe 1976). In contrast, Garcia phase sites, i.e., those found along the eastern shore, contain both bone, tool, and microlithic industries (Gagliano and Saucier 1963).

Closer to the general vicinity of the currently proposed project area, Phillips (1970) identified a Poverty Point phase that he labeled Rabbit Island. Sites associated with the Rabbit Island phase are situated in the Teche-Mississippi region of coastal Louisiana, and artifacts recovered from the type site include non-local lithic materials, microlithics, and baked clay objects (Gagliano 1963). Subsequently, the name Beau Rivage was applied by Gibson (1975) to four Poverty Period sites (16LY5, 16LY6, 16LY13, and 16SL2) that he investigated along the Vermilion River, and that

apparently represent a distinct phase. Beau Rivage, is taken from the type site (16LY5) within the Lafayette corporate limits, and sites of this phase are established in a different geographic setting than sites of the Rabbit Island phase; they are found to the northwest of the previously recorded Rabbit Island sites and they occupy the edge of the prairie terrace that overlooks the alluvial plain (Gibson 1980). A typical Beau Rivage artifact assemblage includes Poverty Point ceramic objects (clay balls and figurines) and lithic materials, but also is comprised of decorative rectangular or circular ceramic objects that have not yet been recovered at more inland Poverty Point locations. Diagnostic projectile points/knives have included, among others, examples of Gary, Wells, Evans, Elam, Sinner, Ellis, Delhi, Marshall, and Palmillas points. These lithic projectile points/knives are characteristically shorter and narrower than those found at other Poverty Point sites.

Bayou Rivage and Rabbit Island phase sites apparently represent geographically distinct examples of Poverty Point culture in south central Louisiana. While Gibson (1975) dates the Bayou Rivage phase from ca. 1,500 - 650 B.C., no dates have been suggested for the Rabbit Island phase. Additional research is required to provide solid chronological information, and to reach conclusions about the relationship between the two phases.

In the original publication of *Louisiana's Comprehensive Archaeological Plan*, 15 Poverty Point sites/components were documented in Management Unit III (Smith et al. 1983). None of these sites is located in Calcasieu Parish.

Woodland Stage (ca. 500 B.C. - A.D. 1000)

Despite the many innovations introduced during the Poverty Point cultural period, it is portrayed frequently as either a Late Archaic period culture or as a pre-Woodland transitional manifestation. The Woodland Stage in Louisiana is a formative one that is characterized by a combination of itinerant and possibly sedentary agriculture, the introduction of the bow and arrow, and the widespread use of ceramics. The Woodland Stage includes three periods: Early Woodland, Middle Woodland, and Late Woodland. The Early Woodland (ca. 500 B.C. - A.D. 1) is represented by the Tchefuncte culture, the Middle Woodland (ca. A.D. 1 - 400) is associated with the Marksville culture and to a lesser extent the Troyville culture, and the Late Woodland (ca. A.D. 400 - 1200) originated with the Troyville culture but is dominated by Coles Creek culture. In most parts of the region, the Woodland Stage was eclipsed by the Plaquemine culture (i.e., the florescence of the Mississippian Stage).

Tchefuncte Culture (ca. 500 B.C. - A.D. 1)

Tchefuncte culture is characterized by the first widespread use of pottery, although within the context of a Late Archaic-like hunting and gathering tradition that maintained a Late Archaic-like tool inventory (Byrd 1994; Neuman 1984; Shenkel 1981:23). The culture first was identified at the type site (16ST1) located on the north shore of Lake Pontchartrain in southeast Louisiana (Ford and Quimby 1945; Weinstein and Rivet 1978). Later, the Tchefuncte culture was defined by Ford and Quimby (1945) based on Works Progress Administration excavations at Big Oak Island (16OR6) and Little Woods Midden (16OR1-5), situated on the southeastern edge of the lake in Orleans Parish.

Originally, Tchefuncte culture was thought to be a local adaptation by an indigenous populace to the southwest Louisiana coast and to the central portion of the Vermilion River in south-

central Louisiana. Tchefuncte or Tchefuncte-like ceramics now have been found in southeast Missouri, northwest Mississippi, the Yazoo Basin, coastal Alabama, and east Texas (Brookes and Taylor 1986:23-27; Mainfort 1986:54; Neuman 1984; Webb et al. 1969:32-35; Weinstein 1986:102). In coastal Louisiana, five phases have been designated for the Tchefuncte period. From west to east, these are the Sabine Lake phase bordering Sabine Lake in southeast Texas and southwest Louisiana; the Grand Lake phase in the Grand Lake and Vermilion Bay area; the Lafayette phase on the west side of the Atchafalaya basin (west of the Vermilion River); the Beau Mire phase below Baton Rouge in the Ascension Parish area; and the Pontchartrain phase encompassing Lake Maurepas and Lake Pontchartrain in the Pontchartrain Basin (Weinstein 1986:108). Within the coastal region situated adjacent to the proposed project area only a total of three phases (Sabine Lake, Grand Lake, and Lafayette) have been documented.

For the purpose of this review, a date range extending from ca. 500 B.C. to A.D. 1 for the Tchefuncte culture will be used; however, research suggests that dates for the Tchefuncte differ quite widely from region to region and occasionally within the same region (Webb et al. 1969:96; Weinstein 1986). Most scholars agree that Tchefuncte dates from as early as 700 B.C. in the south and that it diffuses to the north, where it is known as Tchula, and terminates sometime around A.D. 100 (Gibson and Shenkel 1988:14; Perrault and Weinstein 1994:48-49; Shenkel 1974:47; Toth 1988:19). There is, however, evidence supportive of coastal Tchefuncte sites that were in existence until ca. A.D. 300 (Byrd 1994:23; Neuman 1984:135). If these dates are correct, it implies that the last remaining coastal Tchefuncte communities were coeval with Marksville culture (Toth 1988:27-28).

Tchefuncte ceramics usually are characterized by a soft, chalky paste, and a laminated appearance. They were fired at a low temperature and tempered with either sand or clay (Phillips 1970). Vessel forms consist of bowls, cylindrical and shouldered jars, and globular pots that sometime exhibit podal supports. Many vessels are plain; however, some are decorated with punctations, incisions, simple stamping, drag and jab, and rocker stamping. Punctated types usually are more numerous than stamped types, but parallel and zoned banding, stippled triangles, chevrons, and nested diamonds also represent popular motifs. During the later portion of the Tchefuncte period, red filming also was used to decorate some vessels (Perrault and Weinstein 1994:46-47; Speaker et al. 1986:38; Phillips 1970).

The majority the stone and bone tool subassemblages remained nearly unchanged from the preceding Poverty Point culture. Stone tools included boat stones, grooved plummets, chipped celts, and sandstone saws; bone tools included awls, fish hooks, socketed antler points, and ornaments. In addition, some tools such as chisels, containers, punches, and ornamental artifacts were manufactured from shell. Projectile points/knives characteristic of Tchefuncte culture include Gary, Ellis, Delhi, Motley, Pontchartrain, Macon, and Epps (Ford and Quimby 1945; Smith et al. 1983:163). Bone and antler artifacts, such as points, hooks, awls, and handles, also became increasingly common during this period.

Tchefuncte sites generally are classified either as coastal middens, or as inland villages or hamlets. Settlement usually occurred along the slack water environments of slow, secondary streams that drained bottomlands, floodplain lakes, and littoral zones (Neuman 1984; Toth 1988:21-23). From southwest and south central Louisiana Tchefuncte burials and artifacts suggest an egalitarian social organization. The population probably operated at the band level, with as many as 25 to 50 individuals per band. The widespread distribution of similar ceramic types and motifs implies a patrilocal residence with exogamous band marriage (Speaker et al. 1986:39). Social organization

probably remained focused within macrobands, and hunting, gathering, and fishing remained central to the Tchefuncte lifestyle. Shell midden sites and their associated faunal remains are well known for Tchefuncte culture and document the wide variety of food resources utilized during this period. Recovered faunal remains include deer, opossum, muskrat, raccoon, otter, bear, fox, dog, ocelot, wildcat, alligator, bird, fish, shellfish (freshwater and marine), and turtle (aquatic and terrestrial). Recovered plant remains (all non-domesticated) include squash, gourds, plums, nuts, grapes, and persimmons (Neuman 1984; Smith et al. 1983). Neuman (1984) notes that the remains of crustaceans such as crabs, shrimp, and crawfish do not appear within the Tchefuncte middens. The absence of such readily available food sources probably reflects their relatively low caloric value.

Examination of faunal and floral remains from Morton Shell Mound (16IB3), a coastal Tchefuncte shell midden in Iberian Parish, suggests that some coastal sites were occupied on a seasonal basis, usually in the summer and autumn, and possibly during the spring (Byrd 1994:103). The preponderance of freshwater fish remains at coastal southeastern Louisiana sites such as Big Oak Island (16OR6) and Little Oak Island (16OR7) indicates a reliance on aquatic resources (Shenkel and Gibson 1974). As of 1983, the original publication date for *Louisiana's Comprehensive Archaeological Plan*, 37 Tchefuncte period sites or components had been documented in Management Unit III (Smith et al. 1983). A total of four of these sites were recorded in Calcasieu Parish.

Marksville Culture (ca. A.D. 1 - 400)

Marksville culture, named for the Marksville site (16AV1) in Avoyelles Parish, often is viewed as a localized version of the elaborate midwestern Hopewell culture which filtered down the Mississippi River from Illinois (Toth 1988:29-73). A more highly organized social structure than their Tchefuncte predecessors is implied by the complex geometric earthworks, conical burial mounds for the elite, and unique mortuary ritual systems that characterize Marksville. Some items, such as elaborately decorated ceramics, were manufactured primarily for inclusion in burials. Burial items include pearl beads, carved stone effigy pipes, copper ear spools, copper tubes, galena beads, and carved coal objects. Toward the end of the Marksville period, Hopewellian influences declined, and mortuary practices became less complex (Smith et al. 1983; Speaker et al. 1986).

Ceramic decorative motifs such as cross-hatching, U-shaped incised lines, zoned dentate rocker stamping, cord-wrapped stick impressions, stylized birds, and bisected circles were shared by Marksville and Hopewell cultures (Toth 1988:45-50). Additional Marksville traits include a chipped stone assemblage of knives, scrapers, celts, drills, ground stone atlatl weights and plummets, bone awls and fishhooks, baked clay balls, and medium to large stemmed projectile points dominated by the Gary type.

A variety of exotic artifacts commonly found at Marksville sites suggests extensive trade networks and possibly a ranked, non-egalitarian society. Some commonly recovered exotic items include imported copper earspools, panpipes, platform pipes, figurines, and beads (Toth 1988:50-73; Neuman 1984). The utilitarian material culture remained essentially unchanged, reflecting an overall continuity in subsistence systems (Toth 1988:211).

Marksville peoples probably used a hunting, fishing, and gathering subsistence strategy much like those associated with earlier periods. Gagliano (1979) suggests that food procurement activities were a cyclical/seasonal (transhumance) activity that revolved around two or more shifting

camps. In the southeastern part of the state, shellfish collecting stations on natural levees and lower terraces around Lake Pontchartrain and Lake Maurepas were occupied and utilized during the summer months. During the winter months, semi-permanent hunting/gathering camps on the prairie terrace were occupied. This subsistence technique reflects the fission and fusion that probably originated during the Archaic Stage.

Phase distribution of the Marksville culture has largely been made through a combination of diagnostic ceramic traits and geographic distribution. Within the general vicinity of the current project area, two phases (Jefferson Island and Veazey) have been identified in the south central or Petite Anse region of the state, and representative sites typically are situated along the Teche-Mississippi river channel (i.e., the Jefferson salt dome). Jefferson Island phase sites, discussed by Toth (1977), date from ca. A.D. 1 to 200. Decorated ceramics from this early phase are characterized by curvilinear motifs, rocker stamping, and fabric impression that predates the later Veazey phase (ca. A.D. 200 - 400). This second phase, named for the Veazey site (16VM7) in Vermillion Parish, frequently is associated with a scant presence of Late Marksville/Issaquena ceramic sherds that overlay Tchefuncte period sites of the Grand Lake phase (Jeter et al. 1989; Phillips 1970). Additionally, two southwest Louisiana phases, Lacassine and Lake Arthur, apparently are contemporaries of the Jefferson Island and the Veazey phases. While the Lacassine phase has been well documented by Bonnín and Weinstein (1975 and 1978) following excavations at the multicomponent Strohe Site (16JD10), the Lake Arthur phase has been defined only poorly (Bonnín and Weinstein 1978). According to Phillips (1970), coastal sites from the latter part of the Marksville cultural period may contain Marksville Stamped *var. Troyville*, Yokena Incised, and Churupa Punctated ceramic sherds (Jeter et al. 1989).

As of 1983, the original publication date for *Louisiana's Comprehensive Archaeological Plan*, 38 Marksville sites had been documented in Management Unit III (Smith et al. 1983). Of these, a total of nine sites have been recorded in Calcasieu Parish.

Troyville-Coles Creek Cultures (ca. A.D. 400 - 1200)

Troyville culture, called Baytown elsewhere, was named after the mostly destroyed Troyville mound group (16CT7) in Jonesville, Louisiana. Troyville represents a transition from the Middle to Late Woodland period that culminated in Coles Creek culture (Gibson 1984). Though distinct, these two cultures are sufficiently similar that many researchers group them as a single prehistoric cultural unit. Neuman (1984) places the beginning of Troyville culture at A.D. 395, and Kidder (1988:57) places the beginning of the Coles Creek at ca. A.D. 800. The continuing developments of agriculture and the refinement of the bow and arrow during this time (reflected by Alba, Catahoula, Friley, Hayes, and Livermore projectile point types), radically altered subsequent prehistoric lifeways. During the Troyville cultural period, bean and squash agriculture may have become widespread based on the appearance of large ceramic vessels. This shift in subsistence practices probably fostered the development of more complex settlement patterns and social organization.

Only two Troyville phases (Whitehall and Roanoke) have been described in the coastal region of Louisiana, and these coexistent phases are separated only by their physical/geographic distance (Jeter et al. 1989). According to Phillips (1970), the Whitehall phase is used to describe the eastern portion of state. The Roanoke phase of west Louisiana was more recently defined by Bonnín and Weinstein (1978) based on information gathered during excavation of the Strohe site (16JD10).

The Late Woodland Coles Creek culture emerged from Troyville around A.D. 800 and encompassed an era of considerable economic and social change in the Lower Mississippi Valley. By the end of the Coles Creek period, communities became larger and more socially and politically complex, large-scale mound construction occurred, and there is evidence for resumption of long-distance trade on a scale not seen since Poverty Point times; this implies the reemergence of a chiefdom-like society in the Southeast (Muller 1978). Coles Creek ceramics have been recovered from early Cahokia contexts dating ca. A.D. 900 in southeastern Missouri (Kelly 1990:136). Material and sociopolitical concepts may have migrated into the Lower Mississippi Valley, along with trade items. These changes, at about A.D. 1200, probably initiated the transformation of Coles Creek cultural traits into what is now recognized as Plaquemine culture.

Ceramics of this period are distinguished by their grog and grog/sand tempers, as opposed to the chalky, sand tempered paste of the previous ceramic series. Decorative motifs include cord marking, red filming, and simplified zoned rocker-stamping, as well as decorations with incised lines and curvilinear lines. The Coles Creek peoples continued to use Troyville wares, with some elaborations (McIntire 1958). For instance, the Churupa Punctated and the Mazique Incised designs, both of which are characteristic of the Troyville culture, were used by both Coles Creek and later Plaquemine pottery makers (McIntire 1958). Similarly, French Fork Incised, which formed the basis for many Troyville classifications, continued to be used well into the Coles Creek period (Phillips 1970).

Coles Creek peoples developed a new ceramic complex that included larger vessels and a wider range of decorative motifs, usually positioned on the upper half of the vessel (Neuman 1984). Coles Creek Incised, Beldeau Incised, and Pontchartrain Check Stamped characterize the period (Phillips 1970; Gibson 1976; Weinstein et al. 1979). A distinctive decorative type, Coles Creek Incised, contains a series of parallel incised lines placed perpendicular to the rim of the vessel, often accompanied underneath by a row of triangular impressions (Gibson 1976; Phillips 1970:70; Phillips et al. 1951:96-97). Several of the ceramic motifs suggest outside cultural influences. French Fork Incised motifs and decorative techniques, for example, mimic almost exactly Weeden Island Incised and Weeden Island Punctated from the Northwest Florida Gulf Coast (Phillips 1970:84; Phillips et al. 1951:101; Willey 1949:411-422). Pontchartrain Check Stamped ceramics also appear at the same time as the resurgence of the check stamped ceramic tradition during Weeden Island III in Northwest Florida (Brown 1981:31).

Sites from the Coles Creek cultural period primarily were situated along stream systems where soil composition and fertility were favorable for agriculture. Natural levees, particularly those situated along old cutoffs and inactive channels, appear to have been the most desirable locations (Neuman 1984).

Most large Coles Creek sites, usually located inland, contain one or more mounds. Coles Creek mounds typically are larger, and exhibit more building episodes than the earlier Marksville burial mounds. Burials occasionally are recovered from Coles Creek mounds; however, the primary function of the mounds appears to have been ceremonial. At some Coles Creek sites, mounds are connected by low, narrow causeways; sometimes, plazas are associated with these multiple mound sites (Gibson 1985b).

The complexity of Coles Creek mound systems suggests a more complex social structure; a centralized authority and sizable labor force must have existed to build, maintain, and utilize these mounds. The centralized authority probably was of a special religious class, while the general

population occupied the region surrounding the large ceremonial centers (Gibson 1985b; Neuman 1984; Smith et al. 1983).

Small Coles Creek sites consist mostly of hamlets and shell middens, and they normally do not contain mounds. Coles Creek shell middens commonly occur in the coastal region on higher portions of natural levees (Springer 1974).

The theory that subsistence based on intensive maize agriculture was a hallmark of Coles Creek culture, can no longer be supported (Kidder 1992). Although Coles Creek populations exhibit tooth decay rates consistent with a diet based on starchy foods such as maize, the limited archeobotanical evidence for maize in Coles Creek midden deposits suggests that consumption of some other starchy foods must be the cause (Kidder 1992; Steponaitis 1986). The preponderance of evidence now available indicates that cultivation and consumption of maize was not widespread in the Lower Mississippi Valley until after the Coles Creek period, ca. A.D. 1200 (Kidder 1992:26; Kidder and Fritz 1993). Thus, while maize existed during the Coles Creek period, and has been recovered archeologically, it was not the economic basis of the society.

Some sites in the Petit Anse region, e.g. Morgan (16VM9; Fuller and Fuller 1987), have produced limited amounts of wild plant species, however, subsistence in the coastal region of Louisiana apparently was based on the exploitation of available aquatic and/or terrestrial animal resources. Excavations by Goodwin (1986) at Site 16CM61, a *Rangia* shell midden in the western part of the state, indicated patterns of seasonal exploitation for both marine mollusks and fish. Additionally, at the Pierre Clement site (16CM47) in Cameron Parish, Springer (1979) documented a variety of faunal material including mammals, avian, reptiles, and fish that originated from a Coles Creek component.

Earlier assumptions about the nature and extent of social and political differentiation during Coles Creek also must be reexamined. Square-sided, flat-topped mounds believed to serve as platform bases for elite structures appear first during Coles Creek. However, evidence for the elite residential or mortuary structures often said to be associated with Coles Creek mounds remains elusive prior to A.D. 1000 (Kidder and Fritz 1993; Smith 1986; Steponaitis 1986). Nevertheless, both the form of the platform mounds and their arrangement around plazas is possibly indicative of Meso-american influence (Willey and Phillips 1958; Williams and Brain 1983).

In the central and western areas of coastal Louisiana, early, middle, and late or transitional phases have been defined for the Coles Creek and transitional Coles Creek cultural periods (Brown 1984; Weinstein 1979 and 1986:108; Ryan et al. 1996; Jeter et al. 1989). In the Petite Anse region these include the White Lake phase (ca. A.D. 700 - 900); the Morgan phase (ca. A.D. 900 - 1000); and the Three Bayou phase (ca. A.D. 1000 - 1200). The Coles Creek phases of southwest Louisiana are nearly contemporaneous, and consist of the Welsh (ca. A.D. 700 - 850), Jeff Davis (ca. 850 - 1000), and Holly Beach phases (ca. A.D. 1000 - 1200).

Louisiana's Comprehensive Archaeological Plan documents 196 sites with Troyville-Coles Creek components within Management Unit III (Smith et al. 1983). A total of 43 of these sites occur in Calcasieu Parish.

Mississippian Stage (ca. A.D. 1200 - 1700)

The Mississippian Stage represents a cultural climax in population growth and social and political organization for those cultures occupying the southeastern United States (Phillips 1970; Williams and Brain 1983). In the Lower Mississippi Valley, the advent of the Mississippian Stage is signaled at sites along the lower Mississippi and along the northern Gulf Coast by the arrival of such traits as shell tempered ceramics, triangular arrow points, copper-sheathed wooden earspools, and maize/beans/squash agriculture from the Cahokia area (Williams and Brain 1983). Formalized site plans consisting of large sub-structure "temple mounds" and plazas have been noted across the southeast at such places as Winterville, Transylvania, Natchez, Moundville, Bottle Creek, Etowah, and Kolomoki (Williams and Brain 1983; Hudson 1978; Walthall 1980; Knight 1984). In the coastal region of Louisiana, the Mississippian culture stage is characterized by both the Plaquemine or Emergent Mississippian period (A.D. 1200 - 1450) and by the Late Mississippian period (A.D. 1450 - 1700). However, it is likely that in some parts of the region either Plaquemine culture or a hybrid of that culture was in existence until European contact (Jeter et al. 1989).

Emergent Mississippian Period (A.D. 1200 - 1450/1700)

The Emergent Mississippian period Plaquemine culture appears to represent a transitional phase from the Coles Creek culture to a pure Mississippian culture (Kidder 1988). As stated in the discussion of Troyville-Coles Creek culture, interaction with the emerging Mississippian cultures of the Middle Mississippi Valley probably exerted enough influence during the latter part of the Coles Creek period to initiate the cultural change that eventually became the Plaquemine culture. The Medora Site (16WBR1), described by Quimby (1951) and considered to be the type site, typifies Plaquemine culture. Plaquemine peoples continued the settlement patterns, economic organization, and religious practices established during the Coles Creek period; however, agriculture, sociopolitical structure, and religious ceremonialism intensified suggesting a complex social hierarchy. Plaquemine subsistence probably was based mainly on agriculture and supplemented by native plants and animals. Sites typically are characterized either as ceremonial sites, with multiple mounds surrounding a central plaza, or as dispersed villages and hamlets (Neuman 1984; Smith et al. 1983).

Plaquemine lithic assemblages are quite similar to those of the preceding Troyville-Coles Creek cultural complex and are dominated by the same small projectile point styles (Smith et al. 1983). In addition, Plaquemine ceramics are derived from the Coles Creek tradition, however, they display distinctive features that mark the emergence of a new cultural tradition. In addition to incising and punctuating their ceramics, Plaquemine craftsmen also brushed and engraved decorations on their vessels (Phillips 1970). Plaquemine Brushed appears to have been the most widespread ceramic type. Plaquemine ceramic types included Leland Incised, Hardy Incised, L'Eau Noire Incised, Anna Burnished Plain, and Addis Plain. By ca. A.D. 1450, Kidder (1988) contends that the Plaquemine culture had evolved into a true Mississippian culture.

Gregory (1969) indicates that Plaquemine sites demonstrate a propensity towards lowland areas including swamps and marshes, however, Neuman (1984) cites Hall's observation that Plaquemine culture sites in the upper Tensas basin were located most frequently on well-drained natural levees characterized by sandy soils. In general, coastal sites tend to be smaller and less elaborate; it is suggested that coastal shell middens are a product of early Plaquemine activities (Davis et al. 1979; Brown et al. 1979). The presence of these sites may indicate the persistence of seasonal food procurement strategies and probably are related to continued transhumance activities.

In the Petit Anse region of south Louisiana, Brown (1985) contends that coastal Plaquemine populations descended from incipient Coles Creek peoples, and there is ample evidence of continuance from this preceding culture (Phillips 1970, Hally 1972, Jeter et al. 1989, and others). Under this scheme, the transitional Coles Creek Three Bayou phase (ca. A.D. 1000 - 1200) is supplanted by the ensuing Burk Hill phase (ca. A.D. 1200 - 1600). This phase includes sites along Vermillion Bay, and around the Salt Dome Islands (Brown 1985). Closer to the project area, in southwest Louisiana, the Bayou Chene phase (ca. A.D. 1200 - 1700) has been explained by Weinstein (1985) as a localized expression of Plaquemine/Mississippian development. The Bayou Chene phase is based on the interaction of Transitional Coles Creek/Plaquemine peoples with those of a more localized tradition that likely originated as a result of migrations or diffusion from southeast Texas.

Louisiana's Comprehensive Archaeological Plan documents a total of 83 Plaquemine cultural period sites/components in Management Unit III (Smith et al. 1983). However, in 1983, only seven of these sites had been located in Calcasieu Parish.

Late Mississippian Period (A.D. 1450 - 1700)

During this time, several traits that are now definitive of the Mississippian period were widespread across most of the Southeast. These diagnostic traits include well-designed mound groups, a wide distribution of sites and trade networks, shell tempered ceramics, and a revival in ceremonial burial of the dead (Griffin 1990:7-9). In coastal Louisiana, Late Mississippian culture probably is related to the Pensacola variant. It is Knight's (1984) contention that displaced Mississippian populations from the central Gulf Coast, i.e., the Mobile Bay area, and the Alabama/Tombigbee river systems resettled in coastal Louisiana (Knight 1984). Additionally, Brown and Brown (1978) have recovered Yazoo River basin-like pottery from Avery Island in the Petit Anse region.

Mississippian subsistence was based on the cultivation of maize, beans, squash, and pumpkins; collection of local plants, nuts, and seeds; and fishing and hunting of local species. Major Mississippian sites were located on fertile bottomlands of major river valleys; sandy and light loam soils usually composed these bottomlands. A typical Mississippian settlement consisted of an orderly arrangement of village houses, surrounding a truncated pyramidal mound. These mounds served as platforms for temples or as houses for the elite. A highly organized and complex social system undoubtedly existed to plan these intricate communities.

Ceramic types frequently are characterized by shell tempering, an innovation that enabled potters to create larger vessels (Brain 1971; Steponaitis 1983). Ceramic vessels included such forms as globular jars, plates, bottles, pots, and salt pans. The loop handle has appeared on many Mississippian vessels. Although utilitarian plainware was common, decorative techniques include engraving, negative painting, and incising; modeled animal heads and anthropomorphic images also adorned ceramic vessels. Other Mississippian artifacts include chipped and groundstone tools; shell items such as hairpins, beads, and gorgets; and mica and copper items. Chipped and ground stone tools and projectile point styles such as Alba and Bassett also were common.

Mississippian culture enjoyed a weak presence in south central and southwestern Louisiana, and only two Mississippian or Mississippian-like phases have been recognized. The first, Petite Anse (ca. A.D. 1600 - 1700), has been used to describe Mississippian peoples/traders from the lower Yazoo river basin who traveled to the Petit Anse region (Avery Island) to procure salt (Brown and

Brown 1979). The second, in southwest Louisiana, is the Little Pecan phase (ca. A.D. 1650/1700 - 1750); it is associated with the historic Attakapa, and represents a synthesis of ceramic types that originate from the Lower Mississippi Valley, Louisiana, and from Texas (Jeter et al. 1989, Frank 1976).

Although probably under reported, the original version of *Louisiana's Comprehensive Archaeological Plan* documented only 17 Mississippian cultural period sites/components in Management Unit III (Smith et al. 1983). A single site (16CU127), a multiple use site with a possible historic Mississippian/Attakapan component, has been recorded in Calcasieu Parish.

Protohistoric and Historic Period (A.D. 1500 - 1800)

An understanding of protohistoric and historic Native American cultures of the southeastern United States is severely limited by our frequent inability to recognize the ancestral cultures from which these groups were derived. This is due partially to the waning influence of Mississippian culture, but primarily is a result of the social disruption initiated by the legacy of the de Soto entrada of 1539 - 1543, and the subsequent French and Spanish exploration and colonization throughout the Southeast. These social interactions necessitated a major social/demographic reorganization. Native American population upheaval and depletions were related to warfare, disruptive migrations, and epidemics introduced by European contact (Smith 1987; Davis 1984). Information on protohistoric and historic populations, gleaned only in part from the archeological record, relies predominately on early European chroniclers, the historical record, and later ethnographic accounts of this tumultuous era.

According to *Louisiana's Comprehensive Archaeological Plan* (Smith et al. 1983), only two Native American groups (Attakapa and Opelousa) occupied Management Unit III at the time of European contact. Little is known of the Opelousa who were decimated by European disease between 1715 and 1804, however Swanton (1946), states that they probably were members of the Attakapan linguistic family. The second group were the Attakapa, a Choctaw and Mobilian phrase for "man eater" or "eaters of human flesh". While no acts of their reported cannibalism have ever been documented, this information may have been taken from a French officer, Simars de Delle-Isle, who was stranded on the Louisiana coast in 1719 (Post 1962). The Attakapa are known to have consisted of three or more groups that lived on the Calcasieu, Mermentau, and Vermilion Rivers of Louisiana but extended as far west as the Trinity River in Texas (Swanton 1946; Aten 1983).

Convention holds that as the influence of Mississippian culture declined throughout the Southeast, populations along the northern Gulf Coast reverted to egalitarian societies and readopted the localized/regional hunting and gathering subsistence strategies that had been successful throughout the Archaic and Woodland stages (Peebles and Kus 1977; Peebles and Mann 1983). These strategies were frequently augmented by either itinerant horticulture or small-scale agriculture that produced corn, beans, and squash. Both archeological and ethnographic evidence indicates that the historic Attakapa lived an Archaic period like existence of fishing, hunting, and plant gathering.

The historical record indicates that the Attakapa interacted both with the French and the Spanish, and Swanton (1946) reports that in 1779 they allied against the British and supplied both men and supplies to Galvez for the purpose of attacking forts on the Mississippi River. Disease and disruptive migrations due to colonial expansion and to the change in ownership of the regions from France to Spain and subsequently to England accounted for the disintegration of aboriginal

populations in the area. Subsequently, only about 80 Attakapa warriors inhabited south Louisiana in 1805 (Swanton 1946).

CHAPTER IV

HISTORIC OVERVIEW

Introduction

The project area is located along the Calcasieu River, just below its junction with West Fork, and on either side of the Calcasieu River Saltwater Barrier. This segment of the Calcasieu River extends through Sections 20 and 29, of Township 9S, Range 8W, and it falls on the northern side of the City of Lake Charles, west of the area known as Goosport. Traditionally, the economy in this region has focused on agriculture and timber, and, more recently, on the exploitation of petroleum and natural gas resources. This chapter presents a discussion of the general history of Lake Charles and this portion of Calcasieu Parish.

French Colonial Period

While Spanish expeditions crossed the Louisiana region as early as the sixteenth century, exploration of the Lower Mississippi River Valley did not begin in earnest until René Robert Cavelier, Sieur de la Salle, claimed all the lands drained by the Mississippi River for France in April of 1682. Sixteen years later, in 1698-1699, Pierre le Moyne, Sieur d'Iberville, led a French expedition to explore the lower "Colbert or Mississippi River, from its mouth to the Natchez Nation," and to "establish a colony in Louisiana" (French 1875:29, 31).

Shortly after the founding of the Louisiana colony in 1699, the French began to establish permanent settlements along the Mississippi River and the Gulf Coast; colonization of southwestern Louisiana, however, was not encouraged by the French government. Additionally, settlers were reluctant to leave the security of the Mississippi River posts for the wilderness of "the west," as the French colonists then called the territory. Throughout the early eighteenth century, southwestern Louisiana, also called the Attakapas-Opelousas region, largely remained under the purview of Native Americans. Local Native American groups, however, initiated trade with the colonial government offering pelts, tallow, and horses in exchange for French goods. By the 1740s, a profitable deerskin and fur trade had been established with the "Attakapas Country," a name which replaced "the west" as the common designation for southwestern Louisiana (Figure 7: 1760 French map) (De Ville 1973:16, 24-31, 1986:4; Fontenot and Freeland 1976:1).

By 1750, the French discovered that the southwestern Louisiana prairies were well suited for tobacco cultivation and for cattle ranging. The French government proposed a military post in the Attakapas country as part of its plan to protect and secure the boundaries of the developing Louisiana colony. The *Poste des Opelousas* was established under the command of Louis Pellerin in 1763, shortly before western Louisiana was transferred officially to Spain. The Opelousas Post, situated in the vicinity of modern-day Port Barre (St. Landry Parish), also apparently was referred to as Attakapas, for the region it served; however, that name was discontinued with the establishment of

the *Poste des Attakapas* at present-day St. Martinville (Brasseaux 1987:94; De Ville 1973:32-34; Fontenot and Freeland 1976:19; Pittman 1973:36).

Spanish Colonial Period

With the Treaty of Fontainebleau, executed November 3, 1762, France secretly ceded the Isle of Orleans and the entire Louisiana colony west of the Mississippi River to Spain. By this time, the Louisiana colony had become a financial burden to France, and with impending English victory in the Seven Years' War, the transfer would prevent much of the territory from falling under British dominion. Public announcement of the Louisiana cession was made in 1764; however, France retained control of the relinquished territory until Spanish Governor Don Antonio de Ulloa arrived in New Orleans in March of 1766 (Davis 1971:70, 97-99; Goodwin et al. 1986:46).

Even after the arrival of Governor Ulloa, the French government continued to control Opelousas, retaining Louis Pellerin as post commandant and conveying tracts of land in the name of Louis XV. The population of the post expanded in 1763 with the arrival of French settlers from newly ceded British West Florida. The French ethnic majority and the distance from the Spanish seat of colonial government in New Orleans no doubt contributed to an attempt by the settlers to remain a French colony. The Opelousas District finally yielded to Spanish jurisdiction following the arrival of Lieutenant General Don Alejandro O'Reilly, who assumed governorship in 1769 (Davis 1971:102-105; De Ville 1973:33-35; Pittman 1973:36).

The Opelousas District prospered under Spanish rule. A 1769 survey of the Opelousas Post counted a white population of 197. By 1771, the tally had expanded to 247 individuals comprising 63 white families; additionally, the census listed 109 "*Negres*," 23 "*Mulatres*," and 6 "*Sauvages*" (De Ville 1986:7, 17). Three years later, the number of white households had increased to 136. By the end of Spanish rule in 1803, the district totaled over 2,000 inhabitants. Although the French remained the dominant population group of the Opelousas District, a number of other Europeans also settled there, including Spaniards from Natchitoches and Mexico, British Loyalists, and immigrants from Italy, Germany, Ireland, Switzerland, and Denmark (De Ville 1973:35-40, 1986:4-6).

A few Acadian communities also were established in the Opelousas District; however, Acadian settlement was restricted by Spanish government decree. It has been conjectured that only an estimated eight percent of the inhabitants of the district during the late eighteenth century were of Acadian descent. The westernmost point of eighteenth-century Acadian migration was the small community at "Prairie Faquetaique," located between Bayou des Cannes and Bayou Mallet in present-day Acadia and St. Landry Parishes, well northeast of the Calcasieu River project area (Brasseaux 1987:86, 93-101; Fontenot and Freeland 1976:68; De Ville 1973:35-36).

Among the first colonists to reach the project vicinity was Martin Camersac LeBleu, a Bordeaux native who lived first in Virginia before settling on English Bayou, east of the Calcasieu River (about 10 km [6 mi] southeast of the project area), ca. 1770-1780. West of the river, along Bayou D'Inde (southwest of Lake Charles and the project area), were the homes of Louis Reon, Henry Moss, Pierre Vincent, and Thomas Rigmaiden. Charles Sallier arrived in the area in the early 1780s, but after his marriage to Catherine LeBleu, ca. 1802-1803, he moved his home northward from the mouth of the Calcasieu River to the south shore of the water body known today as Lake Charles (approximately 3 - 4 mi [5 - 6 km] southwest of the project area). Historically, the Salliers probably were the best known of the area settlers -- Catherine, of the pioneering LeBleu family,

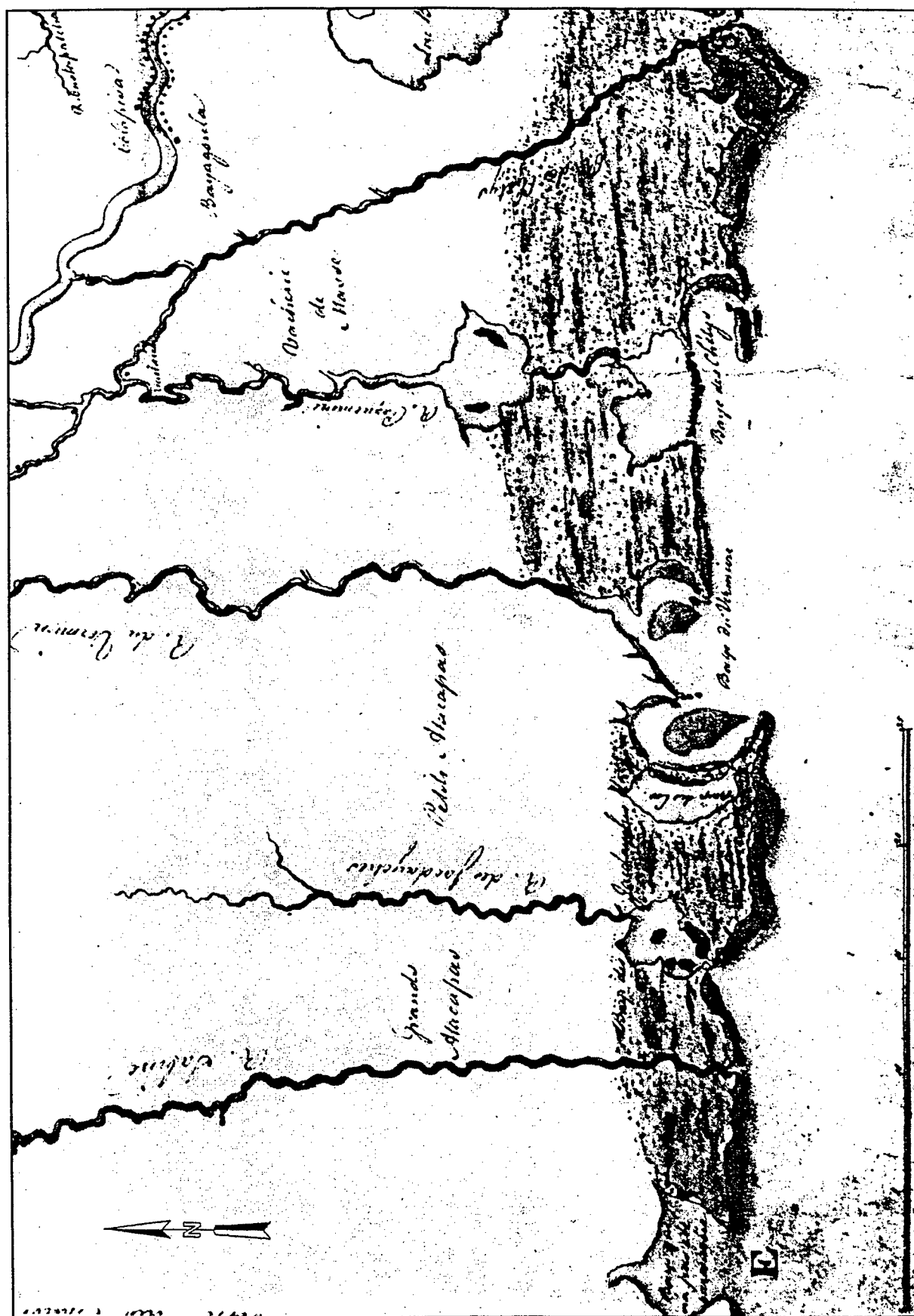


Figure 7. [1760] Excerpt from an untitled map of Louisiana, in reference to the project vicinity. Excerpt depicts the Atacapas [Attakapas] region

claimed the distinction of being the first area's first white female born east of the Calcasieu River, while Charles Sallier was the man for whom Lake Charles was named. Incidentally, both the Sallier and LeBleu homes were said to be frequent (and hospitable) stops for privateer Jean Lafitte when traveling through the region. Area tradition holds that Lake Charles may once have been headquarters or a hideout for Lafitte and his men. Bayou Contraband, on the southwest side of Lake Charles and east of the Calcasieu River, is believed to have been a favored spot for the concealment of his smuggled goods (Cagle 1967; Calcasieu Parish Planning Board [CPPB] 1945:11, 22; Marler 1995:100-102; Stahls 1979:92-93).

The establishment of plantations and settlements along the southwestern Louisiana bayous brought accompanying changes to the colonial resources. Although the fur trade continued to prosper under Spanish jurisdiction, agriculture soon dominated the Opelousas economy. Indigo was a staple crop through the end of the eighteenth century, and tobacco exports were exceeded only by beef exports. In 1769, Spanish officials reported that rice, corn, and sweet potatoes were the principal food crops grown in the Opelousas District. The livestock count included 650 horses, 700 hogs, 200 sheep, 38 goats, 12 mules, and 3 donkeys; however, cattle proved to be the most important asset of the Opelousas settlers, who collectively owned over 2,400 head in 1769. By 1783, the cattle industry had developed to such an extent that brand restrictions were issued to the area cattlemen and a new road was constructed to accommodate the cattle drives to New Orleans (Davis 1960:iii-iv; De Ville 1973:89-93).

The principal settlement in the district was Opelousas, approximately 76 mi (122 km) northeast of the Calcasieu River project area. Because Opelousas was not a deep-water port, cattle and other exports generally were shipped from Church Landing (the present-day town of Washington, north of Opelousas) down Bayou Courtableau to the Atchafalaya River, from which smaller interconnecting waterways flowed to the Mississippi River. Overland, cattle herds were driven from Texas through the Opelousas prairies to Church Landing. The Opelousas Post was the central hub of the district westward toward Texas was the Old Spanish Trail, another road forked northward to *El Camino Real* west of Natchitoches and to the Rapides Post on the Red River, and two major trails led eastward to the Mississippi River above Baton Rouge. According to some sources, the Old Spanish Trail crossed the Calcasieu River through the present-day locations of northern Lake Charles and Goosport, generally following the path of modern U.S. Highway 90 (only 1 mi [2 km] south of the project area); others, however, maintain that it intersected the Calcasieu at a point once known as Comas Bluff, approximately 6 mi (10 km) northeast of historic Lake Charles (about 4 mi [7 km] northeast of the project area) (CPPB 1945:12, 19; De Ville 1973:103-105; Goodwin et al. 1986:48, 57-59; Stahls 1979:92).

Territorial Era

As part of the negotiations leading to the 1803 Louisiana Purchase, Spain restored western Louisiana to France, which shortly thereafter conveyed the Louisiana Territory to the United States. On March 26, 1804, that portion of the Louisiana Purchase located below the thirty-third parallel was designated the Territory of Orleans. The western boundary of the territory was disputed for years because of conflicting border claims. The boundary between French and Spanish possessions long had been ill defined, due either to ignorance of the area geography or to a lackadaisical attitude toward this undeveloped region. France claimed that the Louisiana colony extended westward to the Brazos and Trinity rivers (and as far west as the Rio Grande, according to some sources), while Spain declared that its Texas territory reached eastward into Louisiana to the Calcasieu River and the

Arroyo Hondo, or *Rio Hondo*, a small tributary of the Red River. The United States government accepted the French version of the boundary while negotiating the Louisiana Purchase. The Spanish response was to strengthen its garrison at *Los Adaes* (southwest of Natchitoches). Following the 1803 purchase, the United States revised the western boundary of its new territory eastward to the Sabine River, and took immediate steps to protect the Sabine border and to encourage American settlement in Louisiana. Spain, in the meantime, continued to patrol the region west of Natchitoches (CPPB 1945:10; Clark 1939:69-72; Davis 1971:157-164, 167, 171; Fehrenbach 1991:118; Wentz 1958:1-2, 19, 27).

After a near outbreak of hostilities in 1806, General James Wilkinson and General Simón D. Herrera, the American and Spanish military commanders along the Louisiana frontier, met unofficially and declared that the land between the Sabine River and the *Arroyo Hondo* was to be neutral territory until their respective governments settled the boundary line. Until that time, no new settlers were permitted to move into "no man's land." The "Free State of Sabine" soon became a refuge for outlaws, a source of trouble for both Spaniards and Americans for years, even after the border was fixed at the Sabine River by the Adams-Onís Treaty of 1819 (Figure 8: 1820 Tanner) (Clark 1939:70-73; Davis 1971:171; Fehrenbach 1991:118, 120, 130; Wentz 1958:1-3, 8, 19-20, 27).

In 1805, the legislature divided the Territory of Orleans into 12 counties, the westernmost of which was the county of Opelousas, bounded by the counties of Rapides, Pointe Coupée, Atakapas [Attakapas], the Gulf of Mexico, and the disputed Spanish Texas border. Two years later, the territorial legislature reorganized the county system, further dividing the Territory of Orleans into 19 parishes. St. Landry Parish (named for the Catholic Church at the Opelousas Post) superseded Opelousas County, but it retained the governmental seat at Opelousas. On April 30, 1812, the State of Louisiana was admitted to the Union, although the western boundary remained under contention for many years. The 12-county structure was maintained for certain administrative purposes, then was terminated in 1845 as those needs became obsolete (Figure 9:1816 Darby) (Davis 1960:v; Davis 1971:167-169, 176; Goodwin et al. 1986:59).

Antebellum Era

Imperial St. Landry is the name traditionally given to the vast parish that originally encompassed the present-day parishes of Calcasieu, Beauregard, Allen, Jefferson Davis, Acadia, Evangeline, and St. Landry, as well as portions of Cameron, Vernon, Rapides, and Avoyelles. In 1840, Imperial St. Landry was partitioned into two parishes, Calcasieu and St. Landry, a division that remained relatively constant until the late nineteenth century (Figure 10:1845 Mitchell). The current parish configuration within that region was not established until the early twentieth century (Swent 1966:vi; Thorndale and Dollarhide 1985).

Cantonment Atkinson

Western border troubles continued to plague Imperial St. Landry Parish through the early nineteenth century. Outlaws in the "no man's land" between the Sabine and Calcasieu Rivers robbed and murdered travelers emigrating to Texas, while pirates found the waterways a convenient passage into and out of the Gulf of Mexico. Jean and Pierre Lafitte were among the smugglers who established a contraband trade through the Sabine/Calcasieu territory that was called by epithets ranging from the "Neutral Zone" to "Stinking Hell." The Lafitte brothers' Calcasieu associates

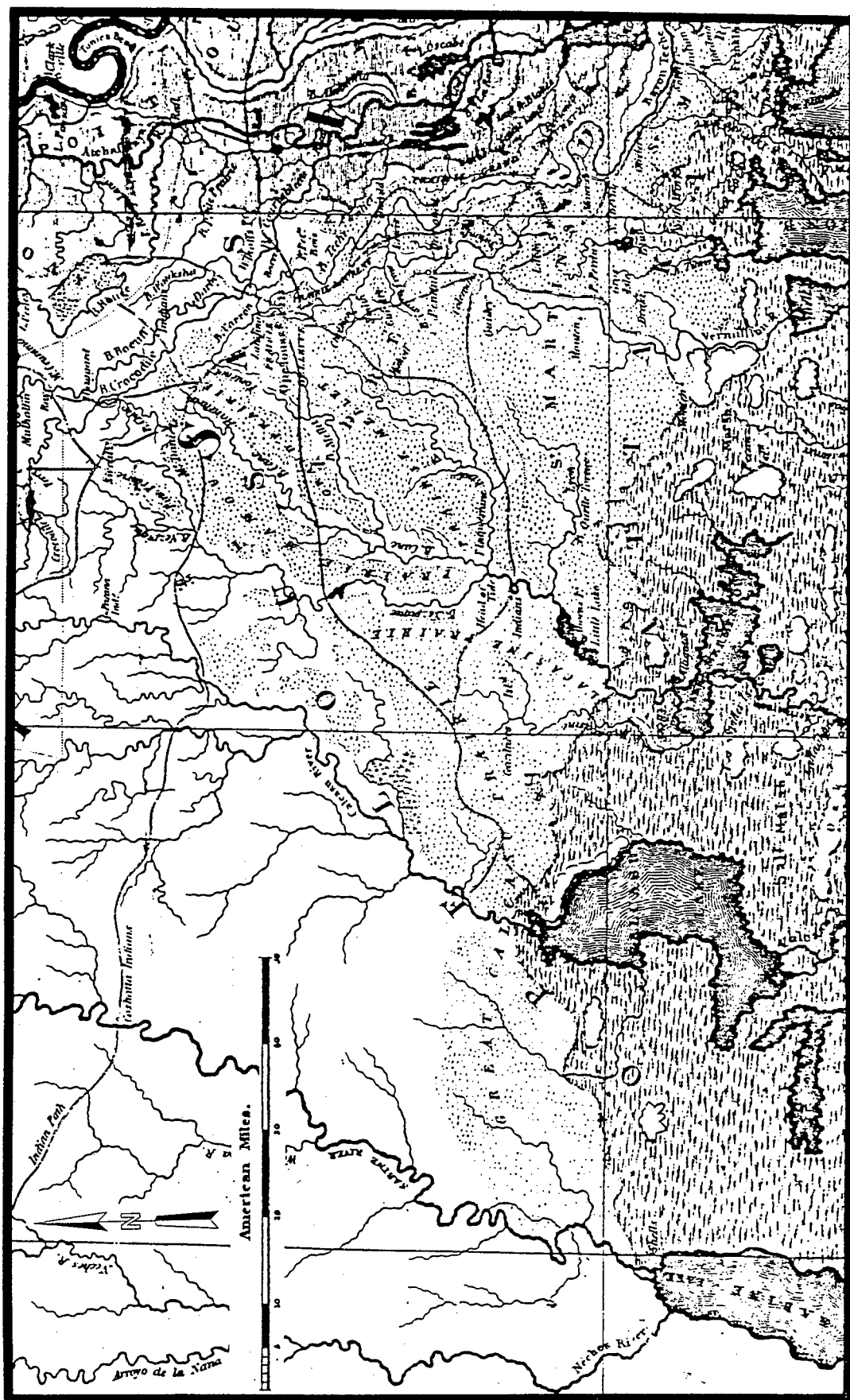


Figure 8. [1820] Excerpt from Tanner's Louisiana and Mississippi, in reference to the project vicinity. Excerpt depicts the southwestern Louisiana prairies and the Sabine/Calcasieu River region



Figure 9. [1816] Excerpt from Darby's Map of the State of Louisiana, with Part of the Mississippi Territory, in reference to the project vicinity. Excerpt depicts state boundaries and early parish divisions (Campbell 1921:416)

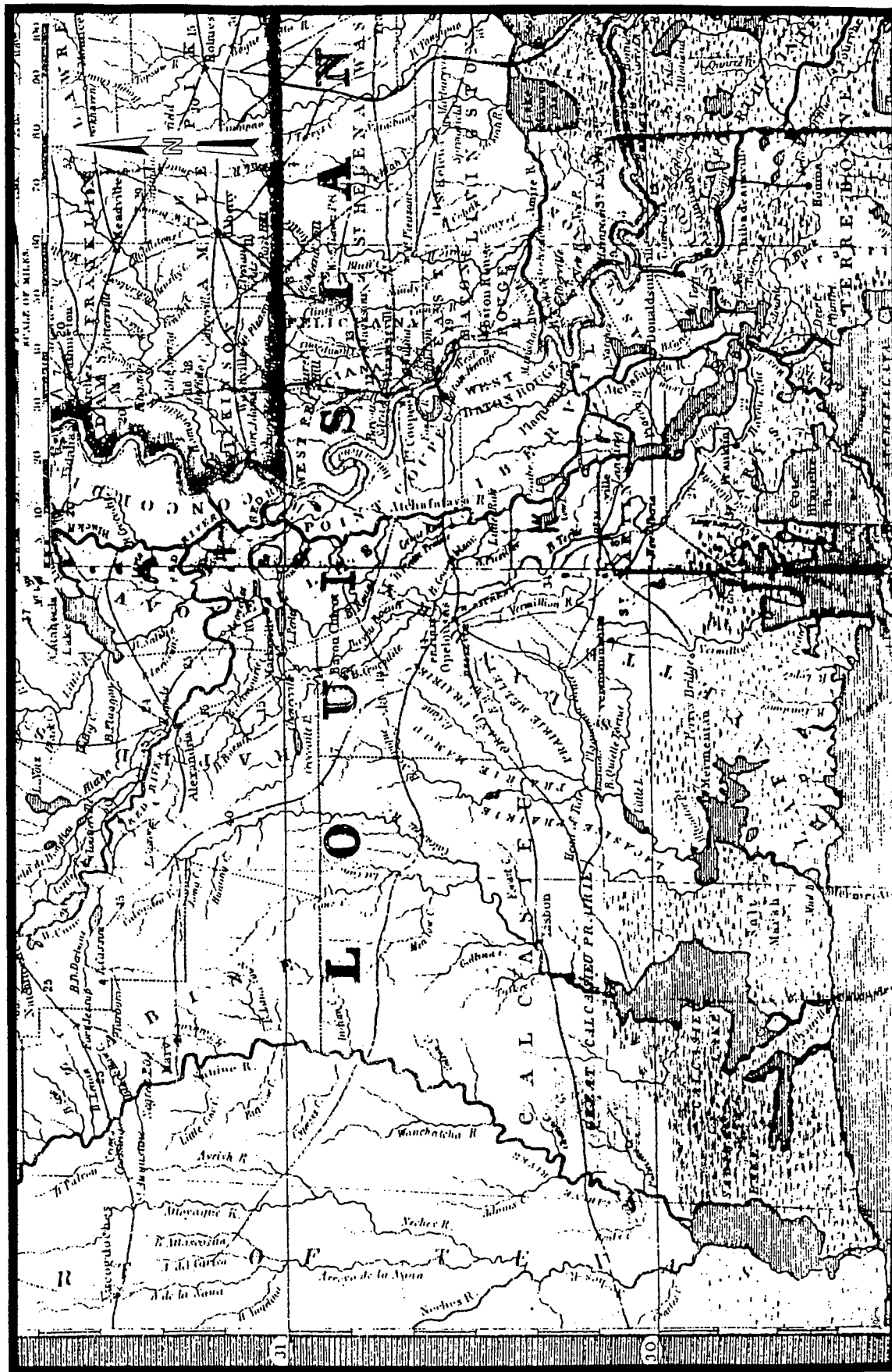


Figure 10. [1845] Excerpt from Mitchell's Map of the States of Louisiana, Mississippi & Alabama, in reference to the project vicinity. Excerpt depicts southwestern Louisiana parish divisions and the western Sabine River boundary

included William Smith, Arsene LeBleu, Michel de Riviere (Pithon), and Charles Sallier -- men whose names later were linked to the respectable development of the Lake Charles region (Davis 1971:171; Marler 1995:1-2, 5,100-102; Wentz 1958:2-3).

The Adams-Onís Treaty established the western limit of Louisiana at the Sabine River in 1819, although the transfer from Spain was not formalized until 1821. Lawless activities continued along the Calcasieu River despite acceptance of the Sabine border. Furthermore, when Mexico declared its independence from Spain in 1821, it refused to recognize that boundary. A new treaty was drawn up in 1828, but the western line was not set and surveyed until 1841 (Figure 8:1820 Tanner, Figure 9:1816 Darby, Figure 10:1845 Mitchell) (Broussard 1959:2-3; Clark 1939:72-73; Wentz 1958:2-3, 19-20, 27).

During the border negotiations, Camp Atkinson (named for Colonel and Brevet Brigadier General Henry Atkinson, first Adjutant General of the U.S. Army) was established in 1822 to help control illicit activities along the Calcasieu River. Camp Atkinson was discontinued by 1829, when it was replaced by Camp Lake Charles, also called the Post at Calcasieu, built immediately above the point where the Calcasieu River entered Charles' Lake on its northern edge. Today, this site would be located in the northwestern part of the present-day city of Lake Charles (Section 31, Township 9S, Range 8W) and approximately 1.5 mi (2.5 km) southwest of the current project area. In July 1830, the post was renamed Cantonment Atkinson, by which name it was known until it was abandoned in January 1832, when the garrison was transferred northward to Fort (Cantonment) Jesup, southwest of Natchitoches along the San Antonio Trace (*El Camino Real*). Although there were no significant conflicts involving the troops at Cantonment Atkinson, the importance of the post lay in the role it played in ending the western border troubles in Louisiana (Figure 11: ca. 1838 Boynton) (Casey 1983:5-6; Wentz 1958:3-5, 8-11, 27-28).

Calcasieu Parish

As noted previously, the Lake Charles area was settled primarily by Frenchmen, with a few Spaniards and other nationalities in the late eighteenth century. These early inhabitants paid their taxes to the Spanish colonial government in Nacogdoches, Texas, a result of the ongoing border dispute of 1819. To counteract Spain's "Rio Hondo" claims, the United States encouraged settlement in western Louisiana after the 1819 border settlement, bringing in a wave of settlers from eastern Texas and the southern seaboard states (Broussard 1959:4; CPPB 1945:11-12; Swent 1966:vi).

Among the early American settlers in the project region was planter/stockman Jacob Ryan, Sr., who brought his family from Georgia (via Vermilion Parish) to the west side of the Calcasieu River in 1817. Ryan established his home in the Bayou D'Inde area pioneered by Pierre Vincent, for whom the resultant community, Vincent Settlement, later would be named. More settlers arrived in the Calcasieu River vicinity during the 1820s and 1830s; those who settled in the region that later became known as Lake Charles included Thomas Bilbo and Michael Pithon. They were joined in the next two decades by sawmill operators Jacob Ryan, Jr., and Anselm Sallier (sons of Jacob Ryan, Sr., and Charles Sallier, respectively), attorney Samuel Adams Kirby, merchant James Hodges, and William Hutchinson (Broussard 1959:4-5, 12; Cagle 1967; CPPB 1945:12).

In 1840, Calcasieu Parish, often referred to as "Imperial Calcasieu," was carved from the western portion of St. Landry Parish between the Sabine River and Mermentau River/Bayou Nezpique (Figure 10:1845 Mitchell). The new parish encompassed 6,000 square miles, an area

including the present-day parishes of Calcasieu, Beauregard, Allen, Jefferson Davis, and most of Cameron. The Calcasieu population was sparse at only 2,050 inhabitants, or approximately one person per 2,000 acres; a decade later, the populace had increased to only 2,957 inhabitants (Seymour 1980:71, 1982:21; Thorndale and Dollarhide 1985).

The original Calcasieu Parish seat was established at Comas Bluff, at the junction of the Calcasieu River and the Old Spanish Trail from Texas to New Orleans. The town later was rechristened Marion, in honor of Revolutionary War hero Francis Marion (Figure 12:1849 Mitchell). In 1852, the courthouse was moved 6 - 7 mi (10 - 11 km) southwestward to the eastern shore of Lake Charles (Figure 12:1860 Mitchell). After the parish seat transition, Marion became known as Old Town. Although that community does not appear on current maps, there is an Old Town Bay that extends off the eastern side of the Calcasieu River in Section 12, Township 9S, Range 8W, just a few miles northeast of Lake Charles and the project area. The location and name of that water body indicate that this once may have been the site vicinity of the first governmental center of Calcasieu Parish (Burwell 1983:v; Cagle 1967; CPPB 1945:12; Swent 1966:vi).

The driving force for the change of parish seat came from Jacob Ryan, Jr. ("Father of Lake Charles"), who gained state consent to haul the courthouse and jail by ox-wagon from Marion to Lake Charles property donated by Ryan and his business partner, James Hodges (with whom he operated a nearby trading post), and attorney Samuel Kirby (Figure 13: Mitchell 1860). The structures were placed on the same tract that today holds the present-day Calcasieu Parish courthouse, located at the intersection of Ryan and Kirby Streets (about 1.5 mi [2.5 km] southwest of the project area). The community that evolved around the justice seat originally was called Charleston (sometimes Charlestown or Charles Town), but it was incorporated as Lake Charles in 1867. As noted previously in this chapter, both town and lake were named for colonist Charles Sallier, who settled shortly after the turn of the century on the shores of what came to be called Charlie's, or Charles', Lake (Broussard 1959:5-6; Burwell 1983:v; Cagle 1967; CPPB 1945:12).

The lumber industry was important to the development of Calcasieu Parish. Area inhabitants utilized primitive methods for cutting timber until 1855, when German native Daniel Goos built his engine-run sawmill at Goosport (just east of the project area) near Charleston. Timber was transported by schooner down the Calcasieu River to the Gulf of Mexico and on to Galveston and the Mexican ports. The lucrative lumber industry expanded to include shipbuilding -- first schooners and then steamers -- which soon became an important influence on the Calcasieu economy. Captain Goos was one of the men who moved from lumber into ship construction and trade; in fact, Goos was the builder of the first Calcasieu River steamboat (Broussard 1959:5; CPPB 1945:12-13).

In 1850, only five families were clustered at the lakeshore site that became Lake Charles. Ten years later, the census counted 430 inhabitants in the Calcasieu Parish seat. By 1859, Charleston was prospering as an agricultural center, as well as a hub for the lumber industry. Fruits and vegetables were the primary crops in this region, though, rather than the large cotton and sugar cane yields of the Mississippi and Red River plantations. Consequently, the Lake Charles vicinity was never a major slave-holding region; in fact, the 1860 census recorded only one large slave owner in all of Imperial Calcasieu Parish. This planter was Captain Farnifold Green, who employed 53 slaves to work his 100 improved acres (40 ha) [research indicates the Green property may have been located east of Sabine Lake in what today is part of western Cameron Parish]. Like the smaller farmers of Calcasieu Parish, Green raised vegetables and livestock -- Indian corn and sweet potatoes, milk cows and working oxen, plus a few horses and mules (Broussard 1959:4-5; Cagle 1967; Menn 1964:165-166).

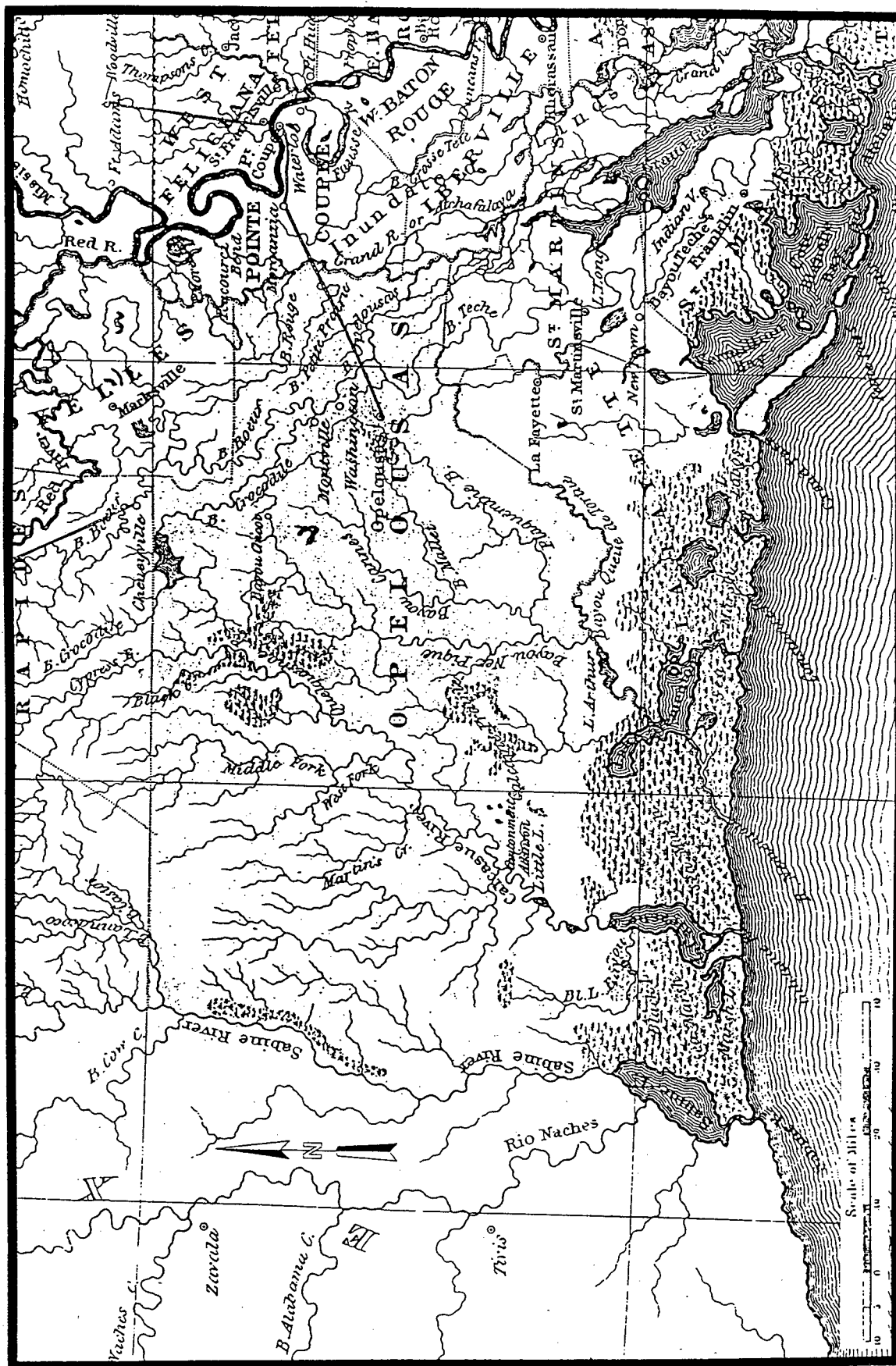


Figure 11. [ca. 1838] Excerpt from [Boynton's] Louisiana, in reference to the project vicinity. Excerpt depicts Cantonment Atkinson within Opelousas County [Imperial St. Landry Parish]

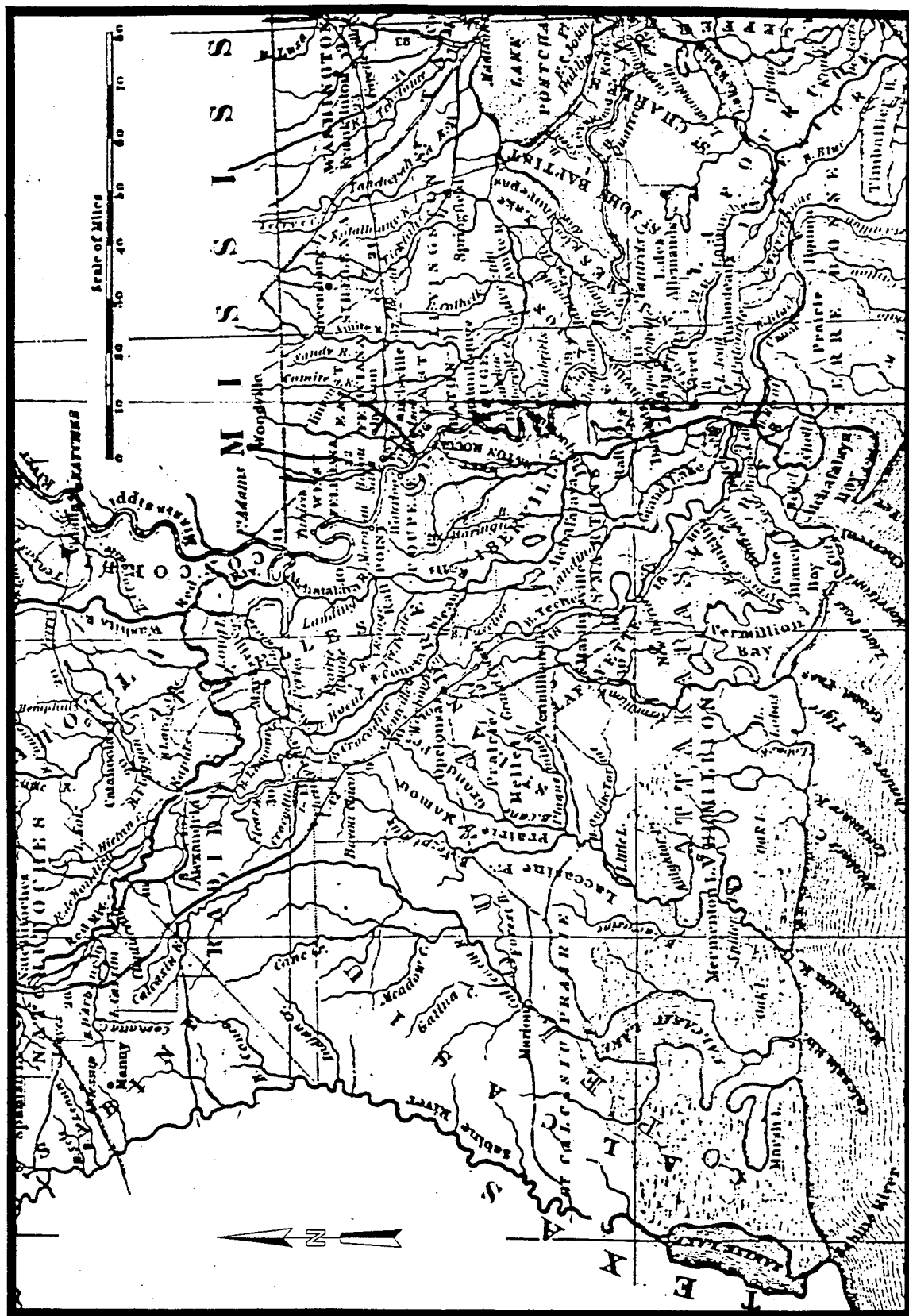


Figure 12. [1849] Excerpt from Mitchell's A New Map of Louisiana, in reference to the project vicinity. Excerpt depicts the town of Marion (parish seat of Calcasieu) and the Old Spanish Trail extending through the Calcasieu Prairie to Texas

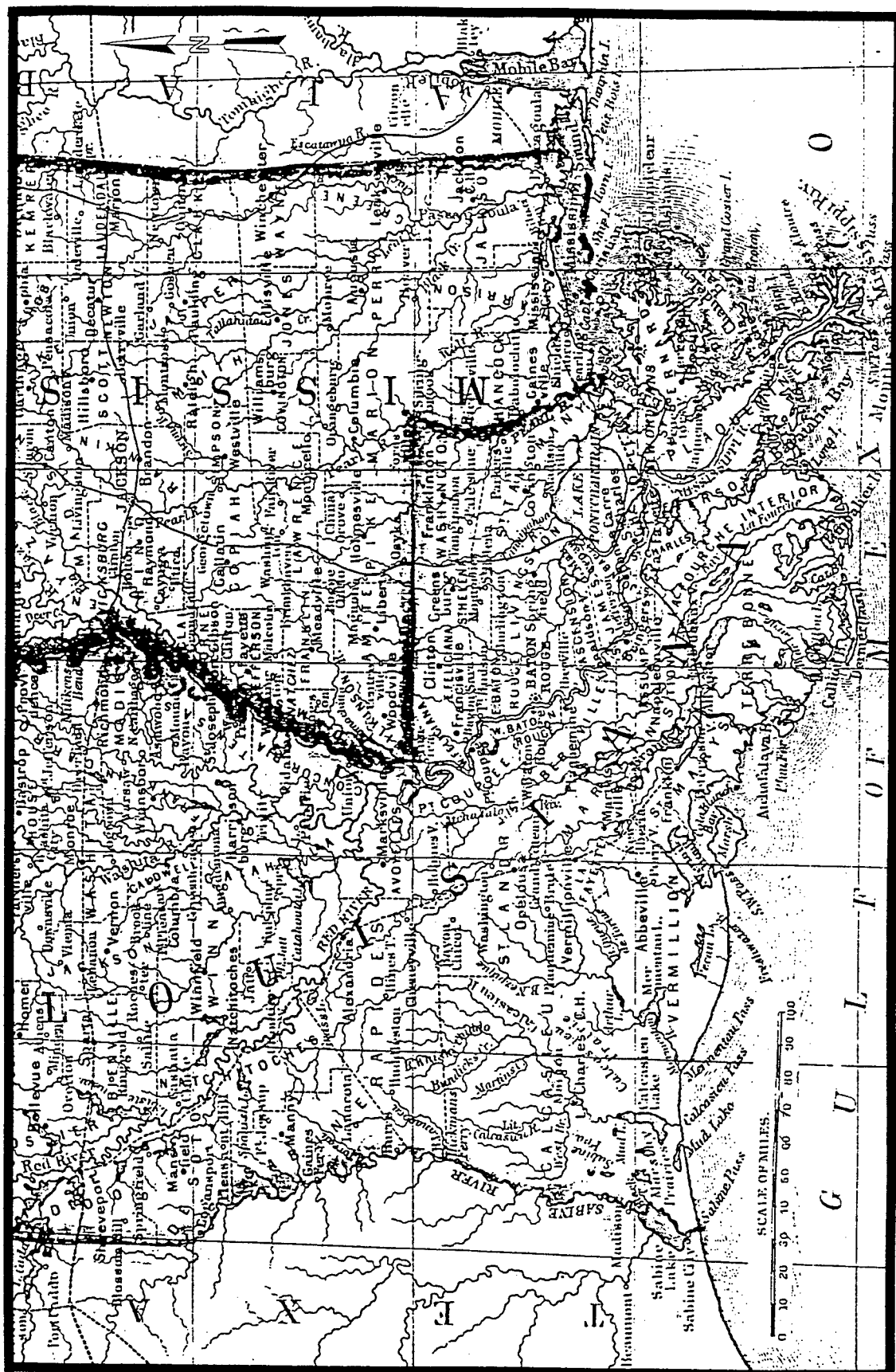


Figure 13. [1860] Excerpt from Mitchell's County Map of Louisiana, Mississippi, and Arkansas, in reference to the project vicinity. Excerpt depicts the Lake Charles Courthouse and the former Calcasieu Parish seat, Marion

Civil War

The Civil War had only an indirect impact on the project area. After New Orleans and Baton Rouge fell in 1862, military operations in Louisiana were focused along Bayou Teche, the Red River, and the Mississippi River, to the southeast, north, and east, respectively, of the Charleston/Lake Charles vicinity. There is no evidence of significant military activity in the project vicinity, other than shipyard operations on Lake Charles, troop movements along the Calcasieu River, and the pursuit of deserters and jayhawkers through the Calcasieu region (Davis 1971:253-265).

Although Calcasieu Parish was well removed from the primary centers of military activity, the parish provided men and supplies to the Confederate cause. In early 1862, Calcasieu and St. Landry Parishes mustered a battalion of "Volunteer State Troops" under the command of Lieutenant Colonel John E. King. King's Special Battalion included the Calcasieu Volunteers, the Calcasieu Tigers (later assigned to the 29th Louisiana Infantry Regiment), the Calcasieu Invincibles, and the Calcasieu Guards. Parish recruits joined the ranks of the Louisiana infantry as late as mid-1864 (Bergeron 1989:140, 181, 185; Cagle 1967; Raphael 1976:20; Winters 1963:75, 383).

Confederate officers took note of the vessels berthed on Lake Charles, e.g., the steamer *T. J. Smith*, "together with several schooners, sloops, flats, &c.", all of which could "be used in crossing troops, provisions, munitions of war, &c., over the river" (U.S. Secretary of War [OR] 1889:26[2]:337). Although concern was expressed over the possibility that Federal troops might capture the vessels on Lake Charles, there never was an enemy advance that far inland (OR 1889:26[2]:337). While Confederate officials pondered the potential military use of the Lake Charles boats, Captain Daniel Goos put his shipping business to work unofficially, making regular blockade runs to Mexico (Marler 1995:214).

Regrettably, while Calcasieu Parish was home to many that were loyal to the Confederates, it also harbored outlaws who frustrated both Union and Confederate forces. Prohibited trade with the Federals thrived along the Calcasieu and Mermentau Rivers because no cavalry could be spared to patrol those southwestern passages to the Gulf of Mexico. More deleterious than the smugglers, though, were the jayhawker bands that roved the countryside, robbing, burning, and murdering their way through the region. The old Neutral Zone was tailor-made for these lawless men. Lake Charles was among the centers of jayhawker activity. Additionally, a jayhawker camp was located less than 20 mi (32 km) to the west, along the Old Spanish Trail near present-day Edgerly; considerable plunder reportedly was buried at this location (Davis 1971:261; Marler 1995:7, 206-208; Winters 1963:322).

Mid-way through the war, Captain Daniel Goos experienced an incident involving the Beckwith Creek Jayhawkers, who operated in the eastern Calcasieu region. According to one account:

One afternoon in 1863, Daniel Goos, a pioneer Lake Charles sawmiller, greeted a dapper cavalryman, in Confederate uniform, and 30 of his horsemen who asked for food and lodging for the night. Goos treated them regally, and the next morning gave them gifts of gunpowder, muskets, lead, drugs, coffee, and corn, for Goos' blockade-runners plied regularly between Lake Charles and Mexico. As the dapper horseman mounted to leave, he enquired [sic]:

"Do you realize who I am? I am Carriere, the Jayhawker."

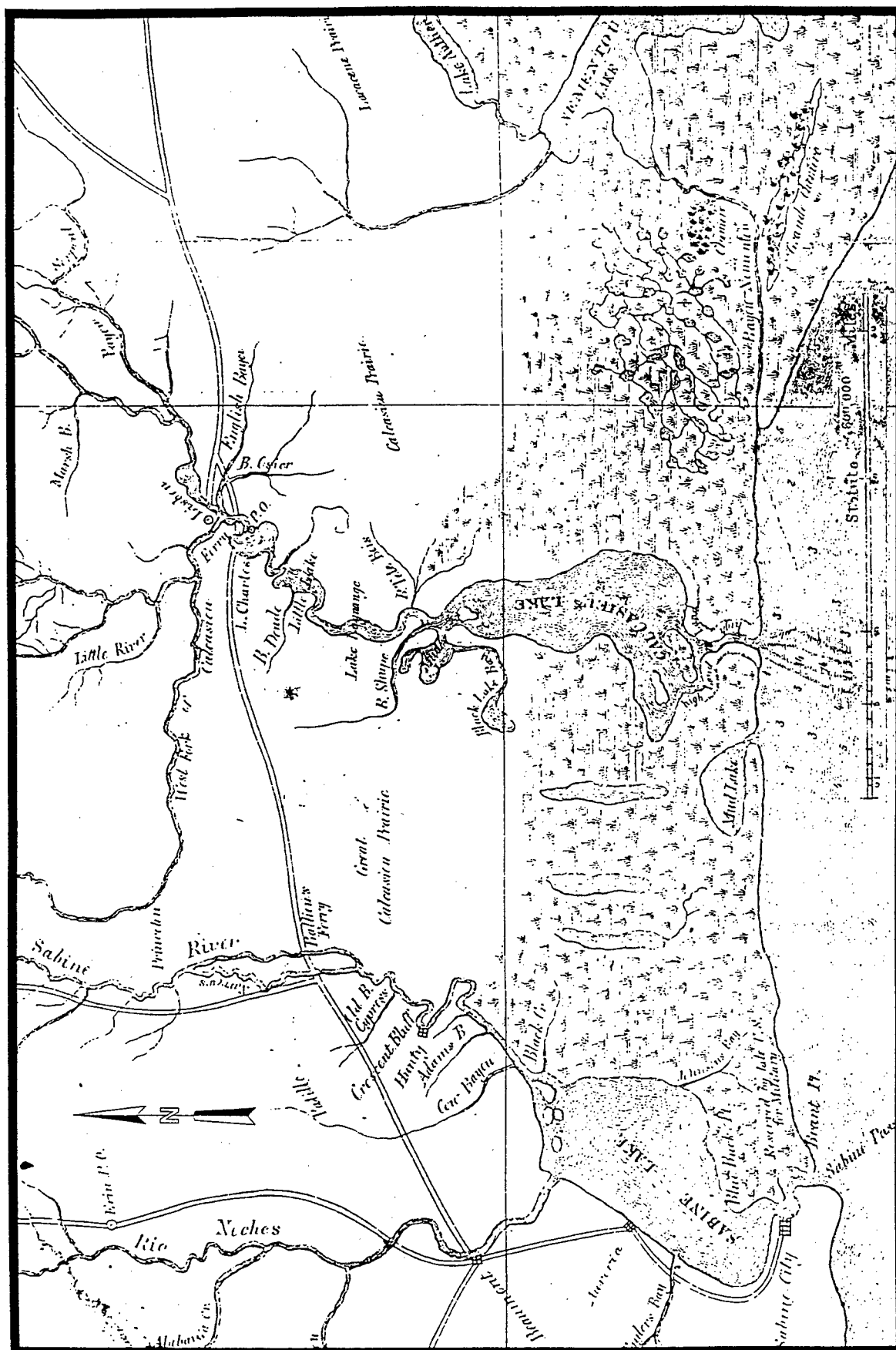
“Last night I came to rob you, Captain Goos!” “You have \$30,000 in gold in a chest under your bed. I came to get that gold, and I would have burned your house and killed you to get it. I might even have burned your sawmill. But you have treated us so royally, and we might need some of your supplies again, so I have decided to not rob you!” (Marler 1995:214-215).

The Goos family, of course, was terrified because of the long-told tales of the depredations of Carriere and his band. As good fortune would have it, the regretfully hospitable Captain Goos never was contacted again by the Beckwith Creek Jayhawkers. Three days after that encounter, though, an unwary traveler, en route from Texas to Opelousas, was held up and killed by Carriere’s men (Marler 1995:215).

In 1864, Confederate officers attempted to solve both the problems of these lawless bands and the chronic manpower shortage. Orders were given “to clear out all the enemy forces, jayhawkers, and deserters from southern Louisiana” as soon as possible. Those men of Calcasieu Parish and other southwestern Louisiana parishes eligible to serve in the military were commanded “to come forward and join the Louisiana infantry regiments on duty in the state on or before the 1st day of June, 1864; otherwise they [would] be considered and treated as jayhawkers and shot down on sight” (Winters 1963:383). This order, of course, accounted for many of those previously mentioned late recruits. Among the forces assigned to clear the jayhawkers and deserters from western Louisiana, as well as muster area conscripts, was the Calcasieu Rangers Company Cavalry, a home guard unit from Hineston in western Rapides Parish. These troops were assigned to jayhawker duty because their home territory once was part of the Neutral Zone, making them naturals for the chases through the forests, canebrakes, and swamps along the Calcasieu River (Bergeron 1989:175-176; Marler 1995:216; Winters 1963:383).

The closest that the Lake Charles region came to direct involvement in the Civil War followed the operations in Calcasieu Pass, May 6 – 10, 1864. In late 1861, Confederate forces had established a “water battery,” surrounded by a breastwork, on Calcasieu Pass, the entrance of Calcasieu Lake into the Gulf of Mexico, some 40 mi (64 km) south of Lake Charles (Figure 14: Holle & Co. 1861). The redoubt was armed with two cannons, a 24-pounder and a 6-pounder, and manned by an 85-man company, whose primary duty was to thwart Federal raids on the southwestern Louisiana cattle ranches (Casey 1983:38).

In late April of 1864, Confederate scouts reported the landing of a small enemy force at Calcasieu Pass. Their expected intent was to travel up the Calcasieu River to Lake Charles, from which point the Federals would move westward against the Sabine River post at Niblett’s Bluff and then southward to “flank” Sabine Pass (Figure 14: Holle & Co. 1861). Colonel William H. Griffin of the 21st Texas Infantry attacked the Union force on May 6, capturing two gunboats, the *Granite City* and the *Wave*, 16 guns, and an estimated 80 prisoners. By the end of the engagement on May 10, the Confederate forces had used the *Granite City* to repel Federal reinforcements and the number of Union prisoners had risen to 189 – 174 troops and 15 “Negroes” (records of capture indicate that the latter may have served as cooks and other labor positions on the gunboats). An estimated 15 – 20 Federals were killed in action, while four of the prisoners died of their wounds. Most of the captured men were sent to Houston, and the two gunboats were sailed upriver to the Lake Charles shipyards. The wounded men (presumably Confederates) were taken to convalesce at the Goosport home of Captain Daniel Goos, who probably had some charge over the gunboat recovery, as well (Cagle 1967; OR 1891:34[3]: 799, 812, 912-914).



Postbellum Era

The years following the end of the Civil War were difficult for southern Louisiana. The economy throughout the state had been destroyed; plantations and farms, railroads and levees, businesses and homes all had been affected by the war, both physically and financially. The postbellum period proved to be an era of recovery for the entire state.

Until the early twentieth century, Calcasieu Parish continued to occupy the territory now covered by the parishes of Calcasieu, Beauregard, Allen, and Jefferson Davis. Because this region was isolated from most of the military action, Calcasieu recovered more quickly from the effects of the Civil War than did other parts of the state. By 1880, agriculture and lumber concerns were "back to normal," and the parish population increased as a result of an influx from the northern and midwestern states (Cagle 1967; CPPB 1945:13).

Calcasieu Parish still was considered cattle country in the postbellum years. Owners ranged their herds on the Calcasieu prairies, rounding them up once or twice a year for branding and for market. Through the late 1870s, cattle drives followed the Old Spanish Trail, also called the "Beef Trail" and the Old Opelousas Road (a remnant of this road survives today as Opelousas Street, which extends through the Goosport section of northern Lake Charles, less than 1 mi [1 km] south of the project area). Herds of between 1,000 and 5,000 head crossed from southeastern Texas, swimming the Calcasieu and Mermentau rivers on the route to Opelousas and the Mississippi River ports beyond. Area inhabitants made a substantial profit, not only from their own cattle sales, but also from field rentals and ferry rates, which averaged 5 cents per head for the Calcasieu swim at Lake Charles. Across the lake from the town of Lake Charles, the community of Westlake (originally called Bryan), located on the west side of Lake Charles and the Calcasieu River (about 3 mi [5 km] southwest of the project area), developed primarily because of the monies generated by the cattle drive crossings at that point (Broussard 1959:57; CPPB 1945:17, 19, 21; Hildebrand n.d.:65).

As the cattle drives were phased out later in the century, the timber industry became increasingly important to the regional economy. Vast quantities of lumber were needed to repair the wartime ravages throughout the South and to supply the demands of Northern industry. Lake Charles, central to both forests and transportation, quickly regained its pre-war status as a lumbering center. Timber was transported down the Calcasieu River to Lake Charles, where it was "rafted" before conveyance to the local sawmills. Lake-berthed vessels then carried the processed lumber downriver to the Gulf of Mexico for shipment to various markets. By 1876, there were 12 sawmills and a number of logging companies working the long-leaf yellow pines of the Calcasieu forests. Less than a decade later, Lake Charles had become the chief timber center of Louisiana (Cagle 1967; CPPB 1945:13, 21; Millet 1966:52-53).

The "Calcasieu Log War" of the 1870s was a brief consequence of the competitive logging industry in the parish. Southwestern Louisiana, including Calcasieu Parish, was home to some unethical lumbermen who utilized questionable methods to obtain their timber. Many of the trees reportedly were pirated from government-owned lands; consequently, in the spring of 1877, a Federal agent was dispatched to the Calcasieu River region to investigate the problem. Special Agent Murray A. Carter was ordered "to ascertain the facts . . . and obtain all data necessary to enable the United States district attorney to institute proper proceedings to seize timber or lumber, to recover value of same, and to prosecute for fine and imprisonment" (Millet 1966:55-56).

Carter's actions included the immediate seizure of over 100,000 logs believed to have been harvested from government acreage, as well as the chain boom blockade of the West Fork of the Calcasieu River (immediately upriver from the project area) and other area waterways. Loggers and millers vehemently objected, insisting that most of the confiscated logs had been cut on private property and that blockades of the parish waters illegally obstructed intrastate commerce. As one local sawmill operator stated: "The whole business of our district is now stopped . . . not a wheel is turning nor a mill going, and all labor is idle. The parish is stagnant, and merchants can not pay their bills under this condition of things" (Millet 1966:56-57). Because of early threats of violence against Carter and other agents, the revenue cutter *Dix* and 80 troops were sent from New Orleans to thwart any action against the Federal men. A manned U.S. post was maintained at Lake Charles from June 1877 – June 10, 1878 (Casey 1983:102; Millet 1966:56).

Eventually, angry Calcasieu Parish residents petitioned Congress, which subsequently investigated their arguments. The ensuing report defended the actions of the Federal agents and apologized to the blameless victims caught in the middle of the controversy. Culpability was directed at those unscrupulous "employers who supposedly encouraged the poor people of Calcasieu to cut government-owned timber at low prices and then compelled them to receive payment in supplies at exorbitant prices" (Millet 1966:57). Although parish residents were not entirely satisfied with the government investigation and report, the "Calcasieu Log War" ended in late 1878 (Millet 1966:57).

During the 1880s, the trend toward "mill-owned" timber acreage became evident as a number of northern-based lumber companies purchased enormous wooded tracts in Calcasieu and other southwestern parishes. Some of the "Michigan men," as these capitalists came to be known, were lumber producers, while others simply were investors. The northern ventures in Calcasieu Parish included the operations of Isaac Stephenson, Jr., J. D. Lacey & Company, and the Wright Blodgett Company (the latter two, in fact, were based in Michigan). There also were a number of locally owned lumber companies, e.g., the Bradley-Ramsey Lumber Company; Lock, Moore & Company; and M. T. Jones & Company (Millet 1966:58-63).

In 1883, a group of English investors, incorporated as the North American Land and Timber Company, purchased 960,000 ac (388,512 ha) of southwestern Louisiana timberland. This company, aided by a federal government offer of land at \$1.25 per acre, was responsible for the immigration of thousands of midwesterners to primarily French Calcasieu Parish. Before long, Lake Charles and Jennings (about 22 mi [35 km] to the east in what is now Jefferson Davis Parish) boasted predominantly midwestern populations. The construction of Morgan's Louisiana Western Railroad, a predecessor of the Southern Pacific, boosted regional growth during the early 1880s, facilitating the southern migration of families from Iowa, Kansas, Nebraska, and other northern states (Figure 15:1881 Rand, McNally). In 1880, prior to railway construction through Lake Charles, the town population only numbered 800; a decade later, the census recorded 3,260 residents, an increase by over 400 per cent (Cagle 1967; CPPB 1945:16; Hildebrand n.d.:2, 6-7). Midwestern influence became so strong in the area that one writer characterized the towns springing up along the railway as "a mixture of 'Iowa Gothic' and French" (Hildebrand n.d.:34).

The coming of the railroad drastically changed the economy of Calcasieu Parish. After the Civil War, Calcasieu Pass had been declared an official port of entry from the Gulf of Mexico. Until railroads crossed the parish, schooners dominated commercial transportation in Calcasieu, carrying the sawmill products and other area exports across Lake Charles and down the Calcasieu River and Calcasieu Lake to the Gulf ports in Texas and Mexico (Figure 15:1881 Rand, McNally). As the



Figure 15. [1881] Excerpt from Rand, McNally & Co.'s Louisiana, in reference to the project vicinity. Excerpt depicts southern Louisiana waterways and railroad lines

timber supply was depleted alongside Calcasieu waterways during the early 1880s, narrow-gauge railways replaced the log "floats." Transportation to commercial centers soon was dominated by the railroads, including Morgan's Louisiana Western (Southern Pacific), the Missouri Pacific (northeastward-bound to Alexandria and on to the midwest), and the Kansas City Southern (Figure 16: 1899 Rand, McNally) (Cagle 1967; CPPB 1945:16-17; Millet 1966:54, 64-66).

Agriculture remained an important element of the Calcasieu Parish economy during the late nineteenth century. In the 1870s, citrus became a primary crop in the Lake Charles vicinity, where there were several large orchards with thousands of orange trees. By the 1880s, timber represented the major "cash crop" of the region. Just a decade later, rice cultivation was established in Calcasieu Parish largely through the efforts of Dr. Seaman A. Knapp, an Iowa native who had come to the Lake Charles area with the North American Land and Timber Company in the 1880s. Knapp encouraged Calcasieu Parish newcomers to apply their midwestern agricultural methods to growing rice. Knapp also was the impetus behind the 1891 founding of a New York-financed, locally owned rice mill in Lake Charles, the largest in the world at that time. His drive to mechanize rice production earned Knapp a place in agricultural history as "father of the rice industry in Louisiana" (Broussard 1959:63; CPPB 1945:16-17; Jefferson Davis Parish Planning Board [JDPPB] 1947:10).

Twentieth Century

Calcasieu remained an enormous parish until the early years of the twentieth century. While the western two-thirds of Cameron Parish had been formed from lower Calcasieu Parish in 1866, it was not until mid-1912 that the parish was whittled down to its present-day configuration. The political boundaries of Calcasieu Parish as they are known today were finally established on June 12, 1912, when Beauregard, Allen, and Jefferson Davis parishes were created from the northern and eastern portions of Calcasieu Parish (CPPB 1945:17; JDPPB 1947:12-13; Thorndale and Dollarhide 1985).

The agricultural trends started in the late nineteenth century in Calcasieu Parish intensified after the turn of the twentieth century. By the time the modern boundaries of Calcasieu Parish were established in 1912, rice had become the chief cash crop of the region. Three decades later, rice was planted on approximately 75 per cent of the cultivated acreage of Calcasieu Parish. The remaining quarter was planted with corn (about 15 per cent), cotton, hay, sweet potatoes, and various other small crops. Beef cattle also remained an important export from southwestern Louisiana. By mid-century, Calcasieu Parish was ranked as one of the state's largest cattle producers (CPPB 1945:26-27; Southern Pacific-Sunset Route [SP-SR] ca. 1909:3, 6, 12).

The lumber industry in Calcasieu Parish prospered until the virgin pine forests were depleted by the mid-1920s. Reforestation programs have been instituted since that time, but the height of the lumbering era has passed. At the turn of the century, there were 21 active sawmills in the Lake Charles vicinity; by 1925 they had shut down all operations. Besides the lumber mills, there were timber-processing facilities that produced such commodities as shingles, bridge timbers, crossties, ship and railroad car construction materials, furniture, and siding. Even Spanish moss was gathered from the trees and processed in limited amounts for use in upholstery and saddlery. By mid-century, however, the timber industry had declined considerably throughout the region, despite the successful development of second-growth stands. In 1944, 13 lumber mills were in operation in Calcasieu Parish, with production expected to increase after the end of World War II (CPPB 1947:17, 30-31; Millet 1966:52, 67-68; Shutts 1967; SP-SR ca. 1909:12).

The petroleum industry was introduced to Louisiana in 1901, when the first oil well in the state was completed in the Jennings Field (located in present-day Acadia and Jefferson Davis parishes), then a part of Calcasieu Parish. Vast oil and gas fields, with their related industries, soon transformed southwestern Louisiana into a "boom" region, a status that lasted until recent years (CPPB 1945:21-22, 32-38; JDPPB 1947:25). By 1956, Louisiana ranked third in the nation in crude petroleum production; 60 per cent of that output was produced in the southern part of the state. The state natural gas ranking was second in that year, with two-thirds of the production emanating from southern Louisiana (Louisiana Department of Public Works 1956:5).

The Ged Field, discovered in 1910, was the first commercial producing field found in present-day Calcasieu Parish. Located in the southwestern part of the parish, it later became known as the Vinton Oil and Gas Field and it remains in production today. While the study region is not situated in the heart of a petroleum field, it is surrounded by petrochemical activity. Pipelines cross the Calcasieu River just above the project area, and Eastlake Oils operates two facilities immediately below this stretch of the river in Section 29 of the project township. Carboline Co., a petroleum industry support facility that manufactures industrial and offshore coatings, also is located in southern Section 29, less than 0.5 mi (1 km) south of the project area (CPPB 1945:32; DTC 1992).

The modern period of industrial development in the Lake Charles region began in 1933 with the establishment of the Mathieson Alkali Works (later known as the Olin Mathieson Chemical Corporation) on the Calcasieu River. Oil refineries entered the area landscape during the early 1940s. Today, numerous industrial facilities have been constructed in the Lake Charles vicinity. Besides the traditional agriculture and timber-related enterprises, e.g., fertilizer plants, tool manufacturers, rice mills, paper mills, and saw mills, there are petrochemical facilities, power plants, seafood processing plants, and chemical waste treatment facilities operating in and around Lake Charles. Facilitating this industrial evolution has been the development of the Port of Lake Charles, located at the southwestern end of Lake Charles, on the east side of the Calcasieu River and above Bayou Contraband (some 4 mi [6 km] southwest of the project area). This terminal, via the deep-water channels traversing Calcasieu Parish, serves as the southwestern Louisiana port for the Gulf of Mexico. Consequently, modern industrial growth in the region has been phenomenal (DTC 1992; Jones 1967; Kaufman 1967).

Summary

The project area is located in a region that historically has remained dependent on its waterways from earliest settlement to the present day. Cattlemen, lumbermen, and small farmers traditionally worked this region of southwestern Louisiana. Their modest homes, corrals, and outbuildings probably would not have survived the years; however, features and artifacts associated with such complexes may have become part of the archeological record. Sawmills were constructed along the area waterways during the nineteenth century, but later were abandoned, as rail transport became dominant; therefore, features associated with late nineteenth-century lumbering more than likely would be found along the railway lines.

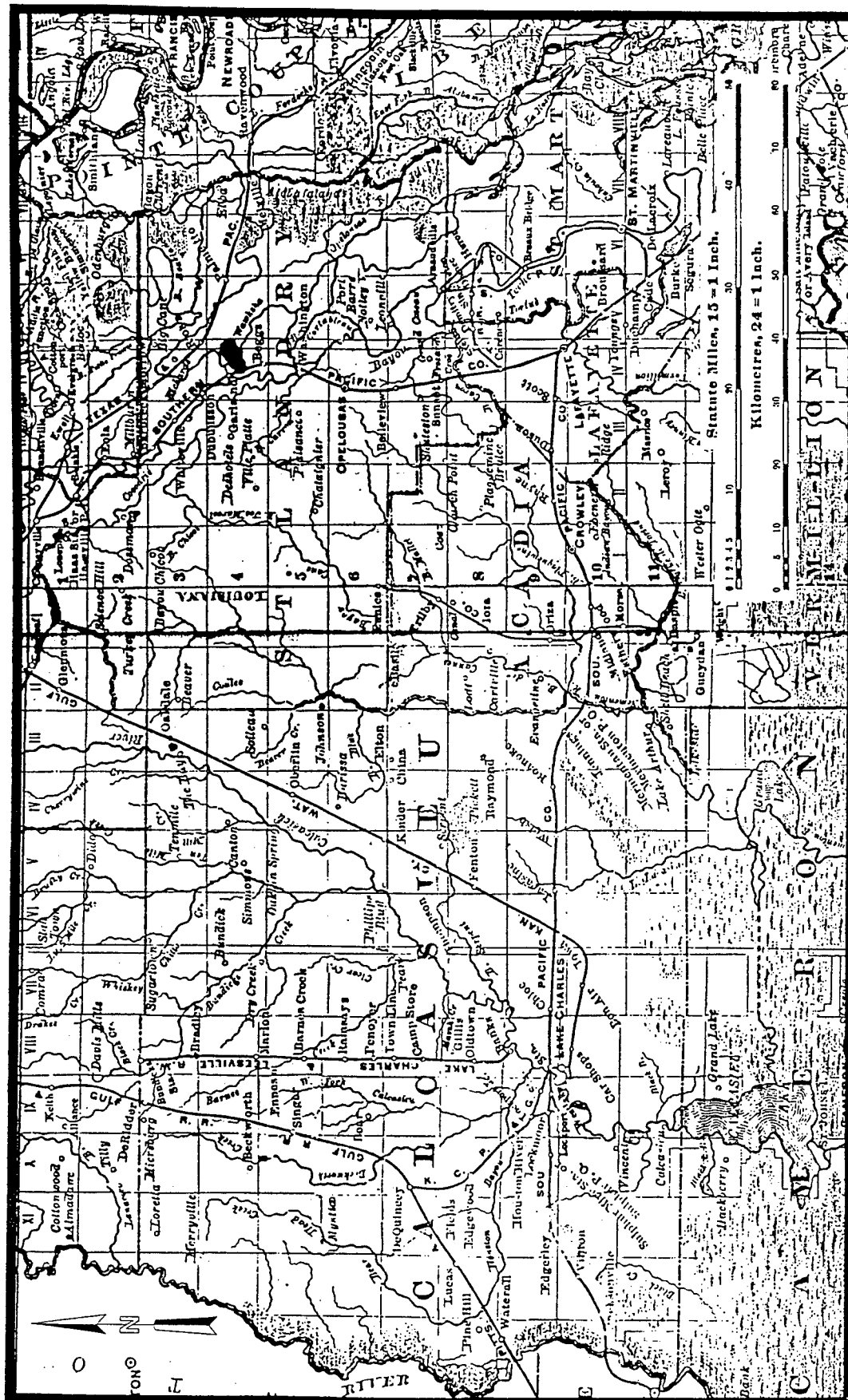


Figure 16. [1899] Excerpt from Rand, McNally & Company's map of Louisiana, from Indexed Atlas of the World, in reference to the project vicinity. Excerpt depicts railroads traversing southwestern Louisiana

CHAPTER V

ARCHEOLOGICAL POTENTIAL

Introduction

The present chapter provides background contextual information about previous archeological and architectural investigations completed within the general vicinity of the project area, and the archeological potential they represent. This information was sought in order to ensure that any previously recorded cultural resources situated within the current study area were relocated during fieldwork. The chapter is divided into five sections. The first contains a review of previous cultural resources surveys completed within 5 mi (8 km) of the proposed Calcasieu River project item. The second section presents a review of previously recorded archeological sites located within 1 mi (1.6 km) of this study area. A description of previously recorded standing structures located within 1 mi (1.6 km) of the project parcel is presented in the third section. The fourth section contains a review of *A Database of Louisiana Shipwrecks* (Clune and Wheeler 1991). The final section looks to the potential of finding any submerged resources. The information contained in this review was based on a background search of data currently on file at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Divisions of Archaeology and Historic Preservation, in Baton Rouge.

The relatively broad 5 mi (8 km) and 1 mi (1.6 km) ranges for studying cultural resources surveys and archeological sites were chosen to maximize understanding of the quantity and quality of data previously gathered on known cultural resources in the region encompassing the project areas. A 1 mi (1.6 km) range was selected for previously recorded standing structures and shipwrecks in order to limit this search to the area immediately surrounding the project corridor. A narrower range was chosen for standing structures because assessments of individual buildings typically focus on relatively specific criteria related to immediate local conditions and events. The 1 mi (1.6 km) range for shipwrecks was selected because these types of cultural resources resulted from specific historical events.

Previously Conducted Surveys Within 5 mi (8 km) of the Calcasieu River Project Area

A total of 17 previously completed cultural resources surveys and archeological inventories were identified within 5 mi (8 km) of the proposed Calcasieu River project area (Table 1). These investigations resulted in the identification of 13 archeological sites and two standing structures. While two sites were located within 1 mi (1.6 km) of the Calcasieu River project area, no previously recorded cultural resources were identified within the currently proposed area of potential effect.

**TABLE 1. PREVIOUSLY CONDUCTED CULTURAL RESOURCE SURVEYS
WITHIN 5 MI (8 KM) OF THE PROPOSED PROJECT AREA**

FIELD DATE	REPORT NUMBER	TITLE/AUTHOR	PROJECT DESCRIPTION	RESULTS AND RECOMMENDATIONS
CALCASIEU PARISH				
1974	22-1219	<i>The Bel Site: 16CU127, Urban Archaeology in Lake Charles, Louisiana (Frank 1976)</i>	Pedestrian survey, auger testing, and unit excavation	It was reported that Site 16CU127 contained both prehistoric and historic components dating from the Marksville period - ca. 1832. No statement as to significance was reported, nor were recommendations made.
1975	22-22	Letter Report. Subject: Examination of possible archeological site uncovered during facility expansion of Port of Lake Charles (Stopp, Jr. 1975)	Pedestrian survey	Examined possible multi-component site uncovered during construction. It was reported that the site was destroyed and the resource was assessed as not significant.
1978	22-363	<i>Cultural Resources Survey of the Proposed Barge Dock at AWECO Incorporated Lake Charles Refinery, Lake Charles, Louisiana, W - 110277 (Frank 1978a)</i>	Records Review, pedestrian survey, and unspecified testing	Relocated previously recorded site 16CU140. No statement as to significance was reported; however, additional testing was recommended.
1978	22-368	<i>Cultural Resources Survey of the Proposed Urban Development Action Grant, City of Lake Charles, Louisiana, SAI No. 78000044 (Frank 1978b)</i>	Records Review, pedestrian survey, and unspecified testing	No cultural resources were identified; no additional testing was recommended.
1978	22-372	<i>Test Excavations at 16 CU. 140: Old Town Bay Site (Frank 1978c)</i>	Pedestrian survey and unit excavation	Identified both prehistoric and historic periods of occupation at Site 16CU140. The site was assessed as not significant; no additional testing was recommended unless features were uncovered during construction.

FIELD DATE	REPORT NUMBER	TITLE/AUTHOR	PROJECT DESCRIPTION	RESULTS AND RECOMMENDATIONS
1978	22-404	<i>Cultural Resources Survey of the Wastewater Collection Facility, Lake Charles, La. (Frank 1978d)</i>	Records review, informant interviews, pedestrian survey, and unspecified testing	Relocated previously recorded sites 16CU115, 16CU146, and 16CU167; however, no statements of significance were reported. No additional testing of the proposed project area was recommended.
1983	22-944	<i>Cultural Resources Evaluation of the Shattuck Street Overpass Project Area, Lake Charles, Louisiana (Coastal Environments, Inc. 1984)</i>	Records review and pedestrian survey	No cultural resources were identified; no additional testing was recommended.
1985	22-1052	<i>Cultural Resource Survey of Proposed Gas Line Replacement, City of Westlake, Calcasieu Parish, Louisiana, MA Project No. 2-41301 (Frank 1985)</i>	Records review, informant interviews, pedestrian survey, and auger testing	Identified Site 16CU193 and relocated Sites 16CU133 and 16CU174; however, no statements as to significance were reported. No additional testing of the proposed project area was recommended.
1988	22-1263	<i>A Cultural Resources Survey of a Proposed Oxidation Pond Facility in Calcasieu Parish, Louisiana (Keller 1988)</i>	Pedestrian survey, shovel testing, and auger testing	No cultural resources were identified; no additional testing was recommended.
1990	22-1505	<i>Level II Cultural Resources Survey of a Proposed Chlorine Pipeline, Calcasieu Parish, Louisiana (Shuman 1990)</i>	Records review, pedestrian survey, and shovel testing	Relocated previously recorded sites 16CU170 and 16CU201. While the former was reported as destroyed, Site 16CU201 was assessed as potentially significant. No additional testing, however, was recommended.
1990	22-1513	<i>Cultural Resources Survey of the Proposed Federal Court Building, Lake Charles, Calcasieu Parish, Louisiana (Frank 1990)</i>	Records review, informant interviews, pedestrian survey, shovel testing, and auger testing	Identified two standing structures which would be impacted by proposed construction; however, both were assessed as not significant and no additional testing was recommended.
1995	22-1899	<i>Cultural Resources Survey of the Isle de Capri Development, Land Based Facilities, Westlake, Calcasieu Parish, Louisiana (Gibson and Frank 1995)</i>	Records review, informant interviews, and pedestrian survey.	No cultural resources were identified; no additional testing was recommended.

FIELD DATE	REPORT NUMBER	TITLE/AUTHOR	PROJECT DESCRIPTION	RESULTS AND RECOMMENDATIONS
1995	22-1930	<i>Cultural Resources Investigations of the Smith Family Cemetery Site (16CU07) in Westlake, Calcasieu Parish, Louisiana (Ryan et al. 1996)</i>	Records review, probing, unit excavation, and backhoe trenching	Site consisted of a late 19th C. cemetery and prehistoric period lithic scatter. Neither component was assessed as significant; however, a total of six burials were exhumed and relocated. No recommendations concerning additional testing were reported.
1997	22-2087	<i>Cultural Resources Survey of Proposed Construction Project on Burnett Bay, Calcasieu River, Calcasieu Parish, Louisiana (Frank 1997a)</i>	Records review, informant interviews, pedestrian survey, and bankline inspection	No cultural resources were identified; no additional testing was recommended.
1997	22-2118	<i>Cultural Resources Survey of Proposed Development of a 615.8 Acre Golf Course and Multiple Use Complex, City of Westlake, Calcasieu Parish, Louisiana (Frank 1997b)</i>	Records review, informant interviews, pedestrian survey, and shovel testing	No cultural resources were identified; no additional testing was recommended.
MULTIPLE PARISHES				
1977	22-335	<i>Cultural Resources Survey of the Beauregard Electric Cooperative, Inc. Moss Bluff Metering - Station Site, Moss Bluff to Ragley 69 Kv Transmission Line, Beauregard and Calcasieu Parishes, Louisiana (Frank 1977)</i>	Records review, pedestrian survey, and unspecified testing	Identified Site 16BE12 outside the proposed project area, therefore the site was not assessed as to its significance and no recommendations concerning additional testing were reported.
1998	22-2171	<i>Archeological Phase I Survey of Eight 90th Regional Support Command Facilities in Louisiana (Parsons Engineering Science, Inc. 1998)</i>	Records review, informant interviews, pedestrian survey and shovel testing	Testing was conducted at eight locations but only one of these (LA013) was located within Calcasieu Parish. No cultural resources were identified at the LA013 project area and no additional testing was recommended.

These inventories are presented here in chronological order and by parish. Those surveys conducted in more than one of these parishes are discussed at the end of the chapter.

Calcasieu Parish

During June and July 1974, the Southwest Louisiana Archaeological Society, Inc., with the permission of Bel Estate, conducted an excavation at Site 16CU127 to determine its cultural affiliation (Frank 1976). The site reportedly was located adjacent to the northeast shore of Lake Charles and within the city limits of Lake Charles. Frank (1976) described Site 16CU127 as a small prehistoric *Rangia* shell midden situated in the vicinity of the former location of Cantonment Atkinson, a ca. 1829 - 1832 American military post. Overall, the site was reported to measure approximately 147 x 156 ft (44.8 x 47.5 m) in area.

Frank (1976) reported that a total of 19 units, each measuring 1.5 x 1.5 m (5 x 5 ft) in size, were excavated at Site 16CU127. Excavation resulted in the recovery of a variety of prehistoric ceramic sherds (including Goose Creek, San Jacinto, Baytown Plain, and Marksville types), lithic artifacts, faunal materials, historic period ceramic sherds, glass shards, metal, flintlock gun parts, and a gunflint. In addition, modern twentieth century cultural material also was reportedly recovered. Diagnostic artifacts recovered from the site suggested that the prehistoric component of Site 16CU127 dated from the Marksville period and that it might have continued into the proto-historic period. In addition, Frank (1976) confirmed the presence of Cantonment Atkinson located just to the north of Site 16CU127. It also was reported that the area that contains Site 16CU127 was utilized as a dump for the City of Lake Charles at an unspecified time prior to 1940. Frank (1976) did not assess the significance of Site 16CU127 nor were any recommendations concerning additional testing of the site reported. Site 16CU127 is not located within 1 mi (1.6 km) of the currently proposed project area.

During October, 1975, G. Harry Stopp, Jr. conducted a pedestrian survey of a tract located in the City of Lake Charles after a shell midden was uncovered during construction associated with the expansion of the Port of Lake Charles facilities (Stopp, Jr. 1975). The survey was conducted at the request of Dorothy Gibbens, Staff Archaeologist, Department of Art, Historical and Cultural Preservation, Baton Rouge, Louisiana. Stopp, Jr. (1975) reported that a shell midden had been exposed adjacent to the existing Port of Lake Charles and that unspecified types and quantities of prehistoric ceramic sherds were observed.

Stopp Jr. (1975) stated that the shell midden had been disturbed by several previous construction episodes that were not associated with port construction. It also was reported that as the shell midden was already destroyed, no significant cultural resources would be impacted by continued expansion of the Port of Lake Charles. No additional testing was recommended unless further expansion of the port was proposed.

On February 22, 1978, Joseph Frank conducted a Phase I cultural resources inventory of a parcel located within S12, T9S, R8W at the request of Wink Incorporated, prior to the proposed construction of a barge dock (Frank 1978a). The overall size of the area subjected to Phase I survey was not reported. Records review and pedestrian survey augmented by unspecified testing resulted in the relocation of previously recorded site 16CU140 within the proposed project area.

Frank (1978a) reported that Site 16CU140 contained both prehistoric and historic period components as well as the ruins of a fishing camp. The site reportedly measured 220 x 375 ft (67.1 x 114.3 m) in area. Unspecified quantities and types of prehistoric ceramic sherds, projectile points, historic period ceramic sherds, and metal were observed at Site 16CU140. Frank (1978a) reported that the historic period ceramic sherds dated from the nineteenth century while the fishing camp ruins represented a twentieth century occupation. No cultural affiliation was reported for the prehistoric component of Site 16CU140. While Site 16CU140 was not assessed, additional testing of the site prior to barge dock construction was recommended. Site 16CU140 is not located within 1.6 km (1 mi) of the currently proposed project area.

On February 15, 1978, Joseph Frank conducted a Phase I cultural resources survey of a parcel located in the City of Lake Charles and adjacent to the northeast portion of Lake Charles at the request of the City of Lake Charles, Community Development Department. This work was completed prior to proposed street, water system, storm sewer, and sanitary sewer improvements (Frank 1978b). The overall size of the project area was not reported. Frank (1978b) stated that an initial records review identified previously recorded Site 16CU127, the former location of Cantonment Atkinson, and the Bilbo Cemetery within the proposed project area. However, pedestrian survey augmented by unspecified testing failed to identify any cultural material in the area of potential effect. Frank (1978b) reported that the three previously identified cultural resources were located adjacent to Lake Charles and that they would not be adversely impacted by the proposed construction activities. No statement of significance was reported for any of the previously recorded cultural resources and no additional testing was recommended. Nonetheless, Frank (1978b) stated that Site 16CU127, the former location of Cantonment Atkinson, and the Bilbo Cemetery comprised a multi-component landmark. He suggested that this landmark should be nominated for inclusion in the National Register of Historic Places. None of these three previously recorded cultural resources are located within 1 mi (1.6 km) of the currently proposed project area.

During 1978, Joseph Frank conducted test excavations of Site 16CU140 at the request of AWECO, Incorporated of Dallas, Texas, prior to the construction of a proposed barge dock (Frank 1978c). The site, which was located within portions of S12, T9S, R8W, reportedly measured approximately 30 ac (12.1 ha) in area, and it contained both prehistoric and historic period components, as well as the ruins of a twentieth century fishing camp. Pedestrian survey augmented by the excavation of an unspecified number of test units measuring 3.3 x 3.3 ft (1 x 1 m) in size resulted in the collection of prehistoric ceramic sherds, lithics, faunal material, *Rangia* and mussel shells, historic ceramic sherds, glass shards, and metal. In addition, a fire hearth extending from approximately 3.5 - 13.4 in (9 - 34 cm) below ground surface and measuring approximately 18.5 in (47 cm) in diameter was identified during excavation of Square 10. Frank (1978c) reported that several prehistoric ceramic sherds, faunal materials representing deer and a variety of small mammals, and an alligator sinus were recovered from the hearth.

Frank (1978c) argued that Site 16CU140 dated from approximately 500 A.D. - 1600 A.D. but that the primary occupation occurred during the late Coles Creek period. In addition, he suggested that the historic period component of Site 16CU140 dated from ca. 1810 - 1850. Site 16CU140 was assessed as not significant, no additional testing was recommended if no cultural features were found during construction of the proposed barge dock (Frank 1978c).

During April, 1978, Joseph Frank conducted a Phase I cultural resources inventory of portions of southwestern Lake Charles prior to the construction of a proposed wastewater collection facility (Frank 1978d). The survey was conducted at the request of Meyer & Associates, Inc. and

Hackett & Bailey. The overall size of the area subjected to cultural resources survey was not stated in the report. An initial records review, interviews with local informants, and pedestrian survey augmented by unspecified testing resulted in the relocation of three previously recorded sites (16CU115, 16CU146, and 16CU167) within the vicinity of the proposed project area; however, no evidence of these sites was noted in the areas that would be adversely impacted by the proposed construction. Sites 16CU115, 16CU146, and 16CU167 were not assessed and no additional testing of the project area was recommended. None of these sites are located within 1 mi (1.6 km) of the currently proposed project area.

On December 6, 1983, Coastal Environments, Inc., conducted a Phase I cultural resources survey of a right-of-way measuring 0.39 mi (0.62 km) by an unspecified width at the request of the City of Lake Charles, Community Development Department. The work was completed prior to the construction of a proposed railroad track overpass located at Shattuck Street in Lake Charles, Louisiana (Coastal Environments, Inc. 1994). The proposed project corridor extended north along Shattuck Street from Interstate Highway 10 to Opelousas Street. An initial records review and pedestrian survey resulted in the identification of 14 residential and four commercial structures that would be adversely impacted by the proposed construction. Coastal Environments, Inc. (1984) reported that all 18 structures dated from the twentieth century and that none of these buildings significant. No additional testing of the proposed project area was recommended.

On September 7, 1985, Joseph Frank conducted a Phase I cultural resources inventory of two parcels (Bagdad and Old Town) totaling approximately 5 ac (2 ha) in area at the request of the City of Westlake, Louisiana, prior to proposed gas line replacement (Frank 1985). Pedestrian survey augmented by auger testing of the proposed Bagdad project area (which was located within portions of S30, T9S, R8W) resulted in the identification of previously recorded site 16CU174 and newly identified site 16CU193. Both sites were assessed as not significant and no additional testing was recommended. Sites 16CU174 and 16CU193 are located within 1 mi (1.6 km) of the currently proposed project area and they are discussed in greater detail in the section on sites below.

The proposed Old Town project area was located within portions of S4 and S9, T9S, R8W. Frank (1985) reported that pedestrian survey augmented by auger testing resulted in the identification of previously recorded Site 16CU133. This site, which was first recorded by Frank Servello in 1974, was described as a shell midden located adjacent to the north bank of the Calcasieu River. Frank (1985) stated that auger testing within the proposed gas line replacement right-of-way failed to identify any cultural material. It was reported that the proposed project would not adversely impact Site 16CU133. The site was not assessed and no additional testing was recommended.

During January, 1988, Southern Archaeological Consultants, Inc., conducted a Phase I cultural resources inventory of a 22 ac (8.9 ha) parcel located adjacent to the southwest bank of English Bayou and approximately 0.5 mi (0.8 km) north of Interstate Highway 10 (Keller 1988). The survey was conducted at the request of an unspecified party prior to the construction of a proposed sewage treatment facility and oxidation pond. Pedestrian survey augmented by shovel and auger testing failed to identify any cultural resources. No additional testing of the proposed project area was recommended.

On July 26 - 27, 1990, Surveys Unlimited Research Associates, Inc., conducted a cultural resources inventory of a proposed 3 mi (4.8 km) long by 75 ft (22.9 m) wide right-of-way prior to proposed construction of a chlorine pipeline (Shuman 1990). The survey was conducted at the request of Ford, Bacon & Davis Sealants of Monroe, Louisiana. Shuman (1990) reported that the

proposed pipeline extended south from the existing PPG, Inc. plant in Westlake, Louisiana, to the existing NL Industries plant also located in Westlake. Following a records review, pedestrian survey augmented by shovel testing resulted in the identification of previously recorded Site 16CU201. In addition, the reported location of previously recorded Site 16CU170 was revisited but Shuman (1990) reported that no evidence of the site was observed. It was suggested that Site 16CU170 had been destroyed previously.

Shuman (1990) reported that Joseph Frank recorded Site 16CU201 in 1986. The site was described as an earth and *Rangia* shell midden measuring approximately 1.7 ac (0.7 ha) in area. It was located adjacent to the north bank of Bayou D'Inde. Pedestrian survey augmented by the excavation of seven shovel tests at the site resulted in the collection of 80 prehistoric ceramic sherds, 3 fragments of animal bone, and 1 lithic flake. Shuman (1990) also reported that during a previous visit to Site 16CU201 a single historic period ceramic sherd had been collected. It was suggested that the site dated from approximately A.D. 1000 - A.D. 1500. Shuman (1990) stated that Site 16CU201 was potentially significant and that additional testing was warranted; however, it was reported that a directional drill would be utilized in order to pass under Site 16CU201 as part of the planned crossing of Bayou D'Inde. Shuman (1990) recommended that the site be monitored during the initial drilling in order to assure that no adverse impact to the site occurred.

Between October 8 - October 13, 1990, Joseph Frank conducted a Phase I cultural resources inventory of a parcel measuring 4.1 ac (1.7 ha) in area located within S32, T9S, R8W. This work was undertaken prior to the construction of a proposed federal court building within the City of Lake Charles (Frank 1990). The survey was conducted at the request of the International Brotherhood of Electrical Workers, Lake Charles, Louisiana. Pedestrian survey augmented by auger testing resulted in the identification of two stranding structures that would be adversely impacted by the proposed project. Frank (1990) reported that both structures were located within the existing Lake Charles Historic District; however, neither structure was considered to represent a contributing element to the district. Both structures were assessed as not significant and no additional testing was recommended.

During 1995, Jon Gibson and Joseph Frank conducted a Phase I cultural resources inventory of a 10.2 ac (4.1 ha) parcel located on the west bank of Lake Charles at Calcasieu River Mile 35.9, prior to proposed Isle de Capri casino development (Gibson and Frank 1995). Following a records review, pedestrian survey of the proposed project area failed to identify any cultural resources. No additional testing of the proposed project area was recommended.

During April and May, 1995, and again on August 24, 1995, Coastal Environments, Inc., conducted a Phase I cultural resources examination within S36, T9S, R9W, in Westlake, Louisiana, to identify, delineate, and exhume the Smith Family Cemetery (Site 16CU07). This investigation was undertaken prior to the construction of a proposed hotel associated with the Isle de Capri Casino (Ryan et al. 1996). The survey was conducted at the request of The Gray Law Firm of Lake Charles, Louisiana. Following a records review, a 110.2 x 149.6 ft (33.6 x 45.6) area was mechanically excavated with a backhoe, revealing six burial pits. Ryan et al. (1996) reported that the entire cemetery was troweled and corners of each burial were marked.

In addition to the burials, cultural material dating from the twentieth century as well as 31 prehistoric lithic artifacts also were noted. It was reported that the lithics represented a Late Archaic period component at Site 16CU07, while the burials represented the Smith Family Cemetery, which dated from the late nineteenth century. Site 16CU07 was assessed as not significant and no additional testing was recommended; however, each of the six burials were exhumed and relocated to

an established cemetery. Site 16CU07 is not located within 1 mi (1.6 km) of the currently proposed project area.

During September, 1997, Joseph Frank conducted a Phase I cultural resources inventory of a 4 ac (1.6 ha) parcel located within S2, T9S, R8W at the request of Nathan Sharp, Jr. of Moss Bluff, Louisiana and Patrick Hay of Lake Charles, Louisiana, prior to proposed housing construction (Frank 1997a). Pedestrian survey augmented by an examination of cut banks failed to identify any cultural resources. No additional testing of the proposed project area was recommended.

During November and December, 1997, Joseph Frank conducted a Phase I cultural resources survey of a 615.8 ac (249.2 ha) parcel located approximately 295.3 ft (90 m) south of the West Fork Calcasieu River in the northern portion of the town of Westlake, Louisiana. This work was completed prior to the development of a proposed golf course (Frank 1997b). The survey was conducted at the request of Meyer & Associates, Inc. of Sulphur, Louisiana. Pedestrian survey augmented by the excavation of 501 judgmentally placed shovel tests failed to identify any cultural resources. No additional testing of the proposed project area was recommended.

Multiple Parishes

During October 1977, Joseph Frank conducted a Phase I cultural resources survey of a proposed power transmission line right-of-way corridor and meter station located in portions of Calcasieu and Beauregard parishes, Louisiana. This investigation was undertaken at the request of Meyer & Associates, Inc. and Beauregard Electric Cooperative, Inc. (Frank 1977). The overall size of the areas subjected to cultural resources survey was not reported. Frank (1977) stated that pedestrian survey augmented by an unspecified type of testing failed to identify any cultural resources within the proposed project areas; however, one site (16BE12) was identified 658.2 ft (200 m) outside of the proposed transmission line right-of-way corridor. Site 16BE12 was described as a small lithic scatter in a pasture. Neither the size of the site nor their cultural affiliations were reported. Site 16BE12 was not assessed and no additional testing of the project area was recommended. Site 16BE12 is not located within 1 mi (1.6 km) of the currently proposed project area.

During March 1998, Parsons Engineering Science, Inc. of Fairfax, Virginia, conducted a Phase I cultural resources inventory of eight 90th Regional Support Facilities (RCS) located throughout the state of Louisiana. This work was completed on behalf of the Department of the Army, 90th RSC, located at Camp Pike Armed Forces Reserve, North Little Rock, Arkansas, and the Detachment 1/Human Systems Center, Occupational Environmental Health Directorate, located at Brooks Air Force Base, Texas (Parsons Engineering Science, 1998). The eight project areas were located in portions of Bossier, Calcasieu, East Baton Rouge, Lafayette, Rapides, Tangipahoa, Terrebonne, and Washington parishes, Louisiana. It was reported that the survey was conducted "in support of the Integrated Training Area Management (ITAM) Program goal of integrating Army training and other mission requirements for land use with sound natural resource management of land" (Parsons Engineering Science, Inc. 1998:1).

While eight areas measuring a combined total of 14.6 ac (5.9 ha) were subjected to cultural resources survey, only one was located within 5 mi (8 km) of the currently proposed project area. This parcel, the Carl J. Shetler USARC facility (LA013), was positioned at 2300 10th Street in the city of Lake Charles, Calcasieu Parish, Louisiana. Parsons Engineering Sciences, Inc. (1998)

reported that pedestrian survey augmented by the excavation of five shovel tests within a 0.5 ac (0.2 ha) portion of the Carl J. Shetler USARC facility failed to identify any cultural resources. No additional testing of this area was recommended.

Previously Recorded Archeological Sites Located within 1 mi (1.6 km) of the Calcasieu River Project Area

A total of two previously recorded sites were identified within 1mi (1.6 km) of the currently proposed Calcasieu River project area (Table 2). Joseph Frank recorded both of these sites (16CU174 and 16CU193) in 1985. Each site is discussed in site number order below.

SITE No.	USGS 7.5' QUADRANGLE	SITE DESCRIPTION	CULTURAL AFFILIATION	FIELD METHODOLOGY	NRHP ELIGIBILITY	RECORDED BY
16CU174	Moss Bluff	Prehistoric shell and earth midden	100 - 900 A.D.	Pedestrian survey and the excavation of two shovel tests	Not significant	Joseph Frank 1985
16CU193	Moss Bluff	Historic period materials scatter	ca. 1830s - 1920s	Pedestrian survey and the excavation of three shovel tests	Not significant	Joseph Frank 1985

Table 2. Previously Recorded Archeological Sites within 1 mi (1.6 km) of the Proposed Project Area

Site 16CU174

Site 16CU174 is located within S30, T9S, R8W, and adjacent to the north bank of the Calcasieu River. The site was recorded by Joseph Frank in 1985 (1985). Site 16CU174 was described as shell midden overlying an earth midden. The site was reported to measure 42.7 x 65.6 ft (13 x 20 m) in area. Pedestrian survey augmented by the excavation of two shovel tests at Site 16CU174 resulted in the recovery of 10 Goose Creek Plain prehistoric ceramic sherds, 1 unspecified projectile point/knife, 10 flakes, and an unspecified quantity of shell. It was suggested that the site dated from 100 - 900 A.D. Site 16CU174 was assessed as not significant and no additional testing was recommended.

Site 16CU193

Site 16CU193 was recorded by Joseph Frank in 1985 (1985). The site was identified within S25, T9S, R8W, and it was described as an historic period artifact scatter. Site 16CU193 reportedly measured 131.2 x 328.1-ft (40 x 100 m) in area. Pedestrian survey augmented by the excavation of three auger tests resulted in the recovery of over 165 historic period ceramic sherds, unspecified quantities of glass shards, and modern period marbles from Site 16CU193. It was suggested that the site represented a ca. 1830s - 1920s period of occupation. In addition, it was noted that Site 16CU193 had previously been destroyed due to disturbance from previous bulldozing in the area. Site 16CU193 was assessed as not significant and no additional testing was recommended.

Previously Recorded Standing Structures Located within Approximately 1 mi (1.6 km) of the Calcasieu River Project Area

A review of the standing structure files located at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Historic Preservation, Baton Rouge, revealed that a small portion of the Lake Charles Historic District was located within approximately 1 mi (1.6 km) of the currently proposed Calcasieu River project area. The Lake Charles Historic District is discussed below.

Lake Charles Historic District

The Lake Charles Historic District was listed on the National Register of Historic Places on March 23, 1990. According to the National Register of Historic Places Registration Form, which was completed during July and August, 1989 by the Louisiana Department of Culture, Recreation and Tourism, the historic district measured approximately 158 ac (63.9 ha) in area. Belden Street bound it to the north, Louisiana Avenue to the east, Iris Street to south, and Hodges Street to the west. Only the extreme northern portion of the Lake Charles Historic District is located within 1 mi (1.6 km) of the currently proposed project area.

It was reported that a total of 380 structures were included in the district. Of these, one previously had been listed on the National Register in 1983 (the Episcopal Church of the Good Shepherd). A total of 98 structures within the Lake Charles Historic District were considered to be noncontributing elements to the district. The contributing elements within the Lake Charles Historic District represented ca. 1880 - 1939 construction. A number of architectural styles, including Queen Anne Revival, Eastlake, Colonial Revival, Bungalow, and Twentieth Century Eclectic, were reported as being present within the historic district. It was noted that approximately 13 percent of the structures located within the district did not feature any particular style and these were listed as Plain or Other.

According to the National Register of Historic Places Registration Form, the Lake Charles Historic District was significant locally in terms of its industry and architecture. It was reported that the district contained all that remained from the Lake Charles lumber industry which accounted for the prosperity of the city during the late nineteenth to early twentieth century. Architecturally, the Lake Charles Historic District was described as one of the largest and best collections of historic structures in southwestern Louisiana.

Previously Recorded Shipwrecks Located within 1 mi (1.6 km) of the Calcasieu River Project Area

As a part of this review a search of *A Database of Louisiana Shipwrecks* (Clune and Wheeler 1991) located at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Archaeology, Baton Rouge was completed. No previously recorded shipwrecks located within 1 mi (1.6 km) of the currently proposed Calcasieu River project area were identified on this database. A search of the AWOIS database also failed to locate any vessel losses within 1 mi (1.6 km) of the survey area.

Potential of Submerged Resources

A review of shipwreck databases, and other written sources indicates a low potential for the existence of submerged vessels. However, the previous sections show a clear and constant growth of industry and population in the Calcasieu River basin. With this in mind, the Calcasieu River has been one of the major means of transportation and commerce since Europeans came to this area. It would follow that there should be numerous unrecorded vessel losses along the Calcasieu River that may be buried, or partially buried.

The geomorphology of the project vicinity suggests that any sunken vessels that may be present will be exposed on the river bottom or along its underwater banks and should be rather easily detected by remote sensing. There is sufficient river discharge and/or scour from tidal currents to preclude sunken vessels from being completely buried by recent channel deposits, and there is no reason to suspect the presence of progressive channel shoaling. In addition, there is no geomorphic evidence to indicate any significant amount of progressive lateral channel shifting and accumulation of point bar (lateral accretion) deposits. This would appear to preclude the possibility of sunken vessels being buried in the riverbanks from that particular process.

This survey is designed to operate within the regional geomorphology and history, to ground truth the moderate potential for location of unrecorded shipping losses within the survey area.

Chapter VI

RESEARCH METHODS

Archival Investigations

Archival research concerning the history of the Calcasieu River Saltwater Barrier Project area focused primarily on two areas: 1) The usage of adjacent land, and its relationship to waterborne transportation on the Calcasieu River; and 2) the identification of specific vessel losses reported near or within the project area. To accomplish this task, background research was conducted at a number of institutions including the Louisiana Collection, Howard-Tilton Memorial Library, Tulane University, New Orleans Louisiana, the Personal library of Allen Green, Hammond, the Louisiana State Office of Historic Preservation, and the United States Army Corp of Engineers New Orleans District. Additional background information on the project area was obtained through interviews with local property owners.

Shipwreck data were obtained through a number of published works including Berman's *Encyclopedia of American Shipwrecks*, *Way's Packet Directory*, and Lytle and *Holdcamper's Merchant Steam Vessels of the United States, 1790-1868*. Supplemental information on area vessel losses was acquired through and the Automated Wreck and Obstruction Information System (AWOIS) of the National Oceanic and Atmospheric Administration (NOAA), a 1989 inventory prepared for the U.S. Army Corps of Engineers, New Orleans District by Coastal Environments, Inc., and the Louisiana State Shipwreck Database.

Archeological Investigations

Marine Remote Sensing Survey

The Calcasieu River marine remote sensing survey was conducted from the 26 ft research vessel *Coli*. *Coli* was leased from the Louisiana Universities Marine Consortium (LUMCON), and was captained by LUMCON's Mr. Samuel LeBuff. The survey was conducted along parallel track lines spaced at 25 ft intervals. The project area was approximately 150 x 6,700 ft, in size, and consisted of three blocks of seven transect lines, with a total length of approximately 9.0 linear miles (Figure 17).

The remote sensing survey was designed to identify specific magnetic or acoustic anomalies and/or clusters of anomalies that might represent potentially significant submerged cultural resources, such as shipwrecks. The natural and anthropogenic forces that form these sites typically scatter ferrous objects such as fasteners, anchors, engine parts, ballast, weaponry, cargo, tools, and miscellaneous related debris across the river bottom. Usually, these objects can be detected with a marine magnetometer; side scan sonar system, and sub-bottom profiler that record anomalous

magnetic or acoustic underwater signatures that stand out against the ambient magnetic or visual field. Two critical elements in the interpretation of such anomalies, which may also derive from natural or modern sources, are their patterns and, in the case of magnetic anomalies, their amplitude and duration. Because of the importance of anomaly patterning, accurate recording and positioning of anomaly locations is essential.

The equipment array used for the Calcasieu River survey included a DGPS, a proton precession marine magnetometer; a side scan sonar, and a sub-bottom profiler. Data were collected and correlated via laptop computers using hydrographic survey software.

Positioning. A Differential Global Positioning System (DGPS) was used to direct navigation and supply accurate positions of magnetic and acoustic anomalies. The DGPS system consisted of a Northstar 941XD with internal DGPS. The Northstar 941XD transmitted position information in NMEA 0183 code to the computer navigation system (version 7.0 of Coastal Oceanographics' *Hypack* software). *Hypack* translates the NMEA message and displays the survey vessel's position on a computer screen relative to the pre-plotted track lines. During post-processing, *Hypack's* positioning files can be utilized to produce track plot maps and to derive the X, Y, and Z values used to produce magnetic and bathymetric contour plot maps. For the Calcasieu River marine remote sensing survey, positioning control points were obtained continuously by *Hypack*, at one-second intervals. During the course of the survey, strong differential signals were acquired with a minimum noise to signal ratio.

Magnetometry. A Geometrics G866 proton precession marine magnetometer was used to complete the magnetic survey. The G866 is a 0.1 gamma sensitivity magnetometer that down loads magnetic data, in digital format, as numeric data files in *Hypack*. As the magnetic data are being collected, *Hypack* attaches the precise real-time DGPS coordinates to each magnetic reading, ensuring precise positioning control. The magnetometer was towed far enough behind the survey vessel to minimize the associated noise, which generally measured less than two gammas. A float was attached to the magnetometer sensor, so that a consistent depth below the water's surface could be maintained. The recording proton precession marine magnetometer is an electronic instrument used to record the strength of the Earth's magnetic field in increments of nanoTeslas or gammas. Magnetometers have proven useful in marine research as detectors of anomalous distortions in the earth's ambient magnetic field, particularly distortions that are caused by concentrations of naturally occurring and manmade, ferrous materials. Distortions or changes as small as 0.5 gammas are detectable when operating the magnetometer at a sampling rate of one second. Magnetic distortions caused by shipwrecks may range in intensity from several gammas to several thousand gammas, depending upon such factors as the mass of ferrous materials present, the distance of the ferrous mass from the sensor, and the orientation of the mass relative to the sensor (Figure 18). The uses of magnetometers in marine archeology and the theoretical aspects of the physical principals behind their operation are summarized and discussed in detail in Aitken (1961), Hall (1966, 1970), Tite (1972), Breiner (1973), Weymouth (1986), and Green (1990).

Individual anomalies produce distinctive magnetic "signatures." These individual signatures may be categorized as: 1) positive monopole; 2) negative monopole; 3) dipolar; or 4) multi-component (Figure 19). Positive and negative anomalies refer to monopolar deflections of the magnetic field and usually indicate a single source. They produce either a positive or negative deflection from the ambient magnetic field, depending on how the object is oriented relative to the magnetometer sensor and whether its positive or negative pole is positioned closest to the sensor. Dipolar signatures display both a rise and a fall above and below the ambient field and they also are

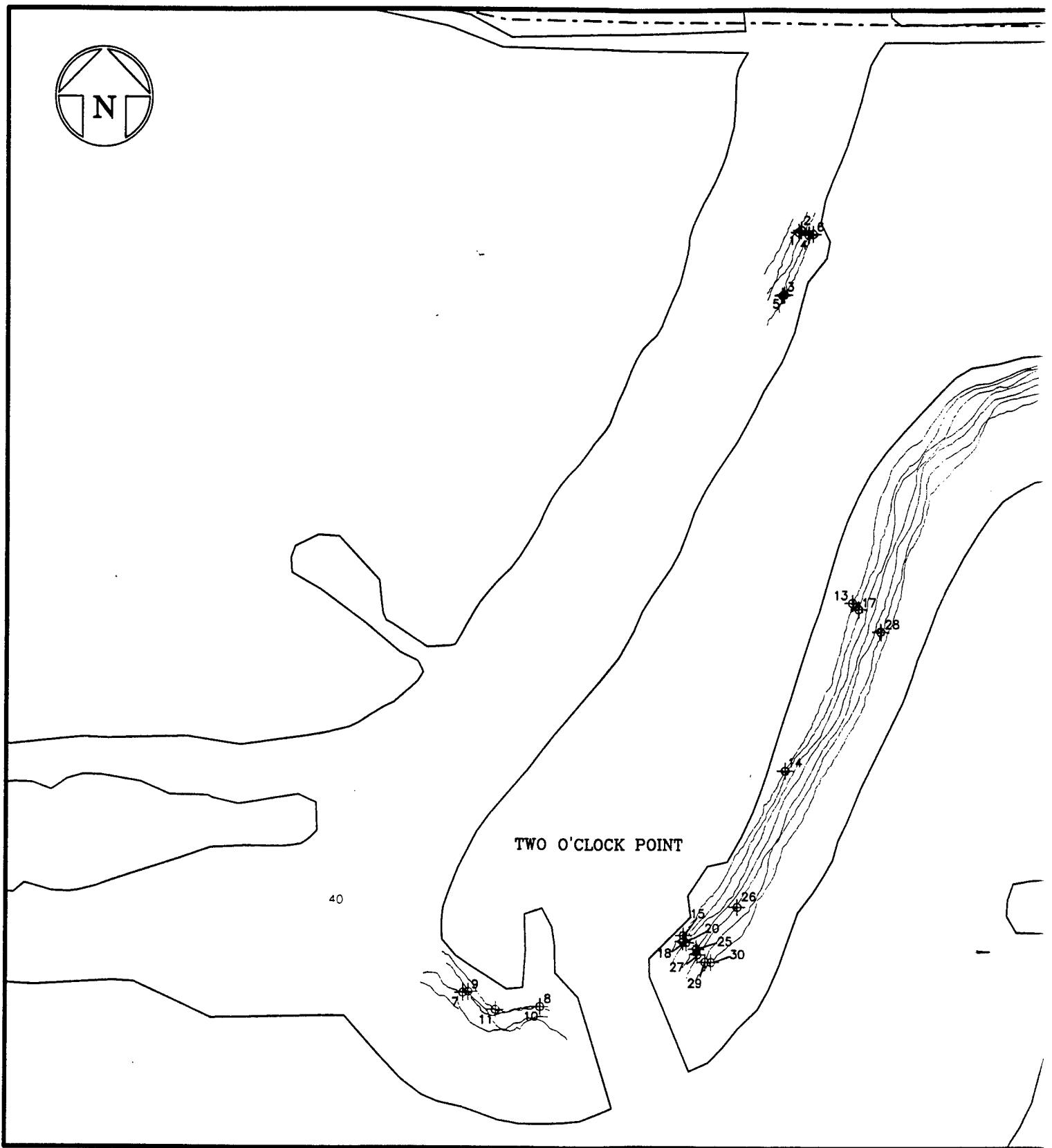
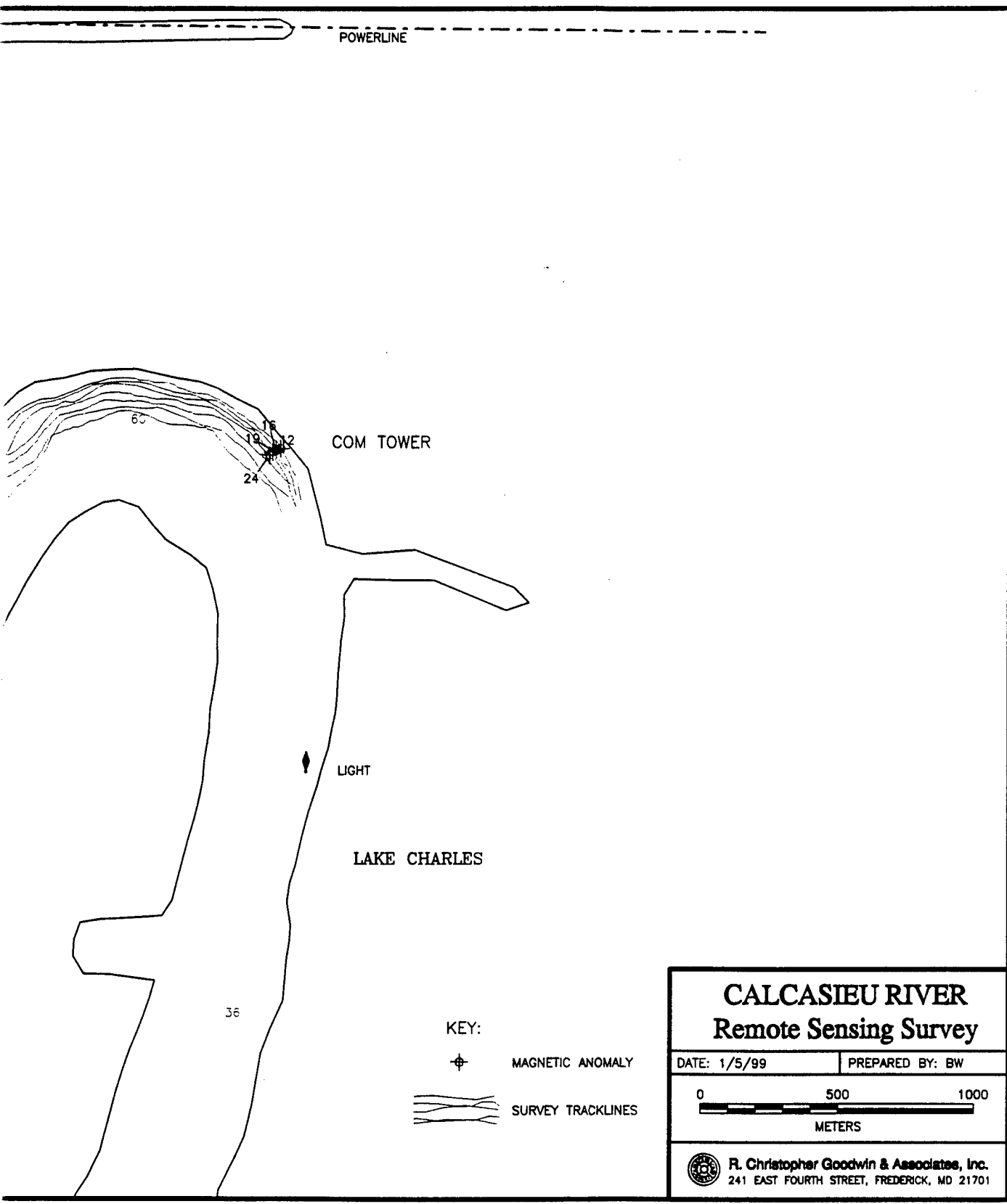


Figure 17. Spatial distribution of the magnetic anomalies found in the Calcasieu River Saltwater Barrier Project area.



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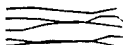
LIGHT

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KEY:



MAGNETIC ANOMALY



SURVEY TRACKLINES

CALCASIEU RIVER Remote Sensing Survey

DATE: 1/5/99

PREPARED BY: BW



R. Christopher Goodwin & Associates, Inc.
241 EAST FOURTH STREET, FREDERICK, MD 21701

2 of 2

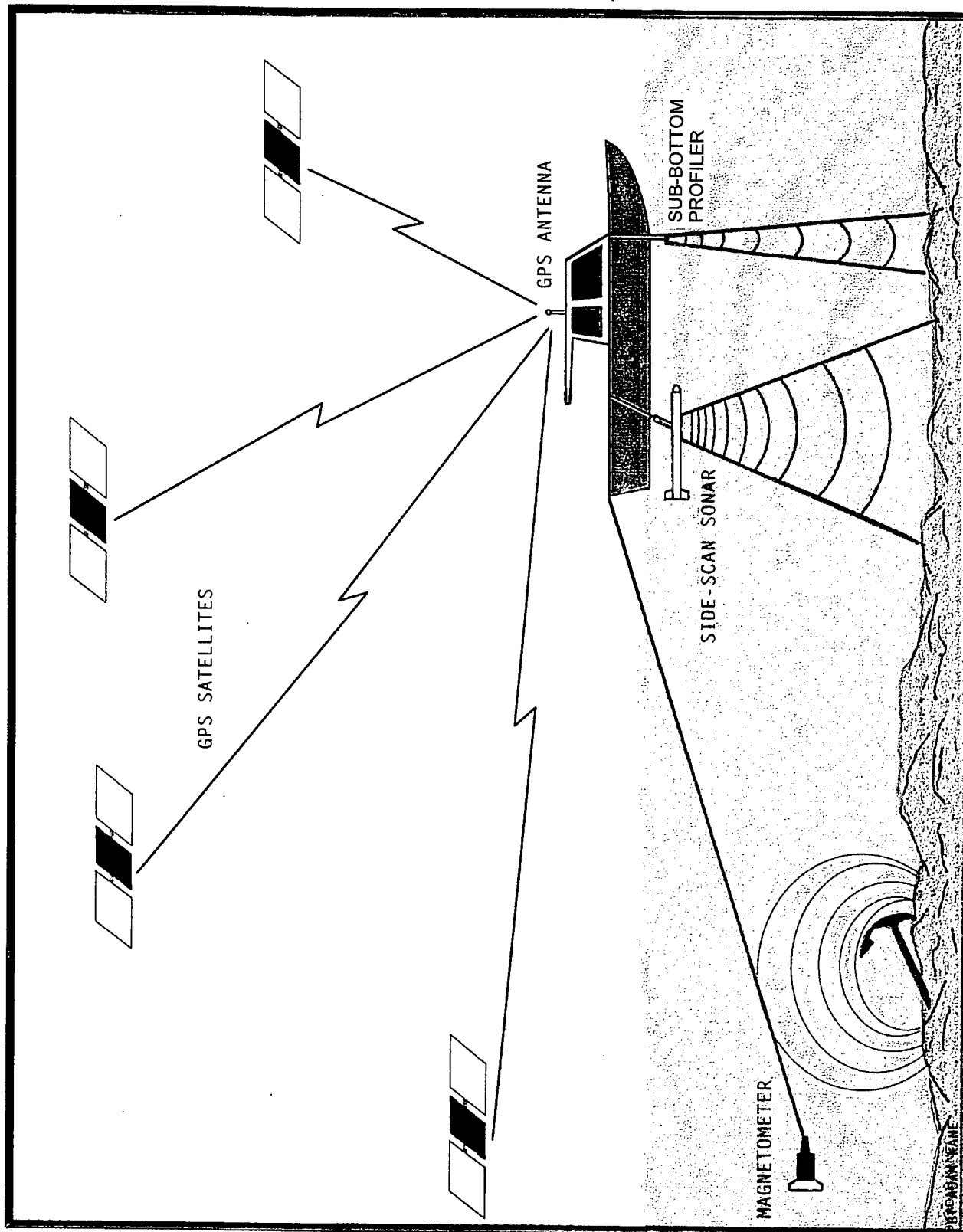
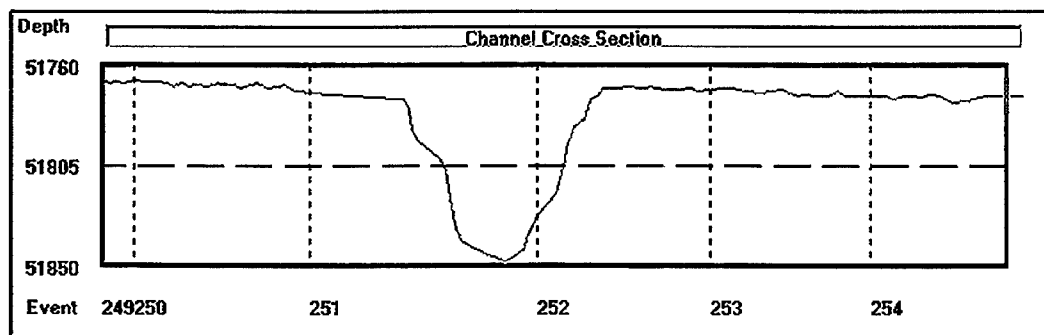
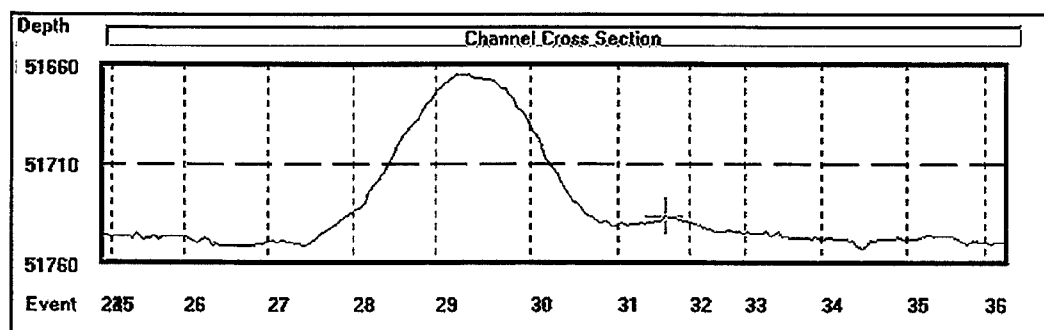


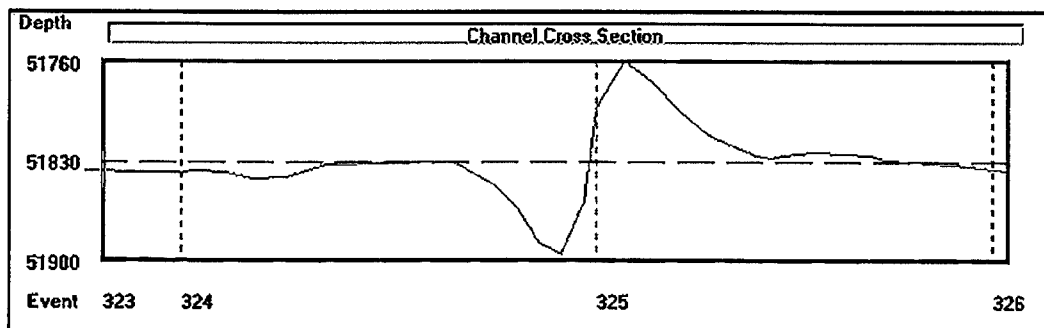
Figure 18. Array of instruments used during the Calcasieu River Saltwater Barrier Project



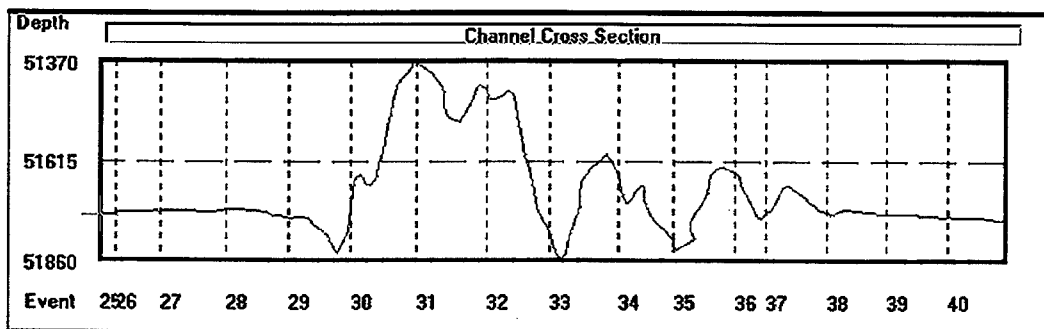
POSITIVE MONOPOLAR MAGNETIC ANOMALY



NEGATIVE MONOPOLAR MAGNETIC ANOMALY



DIPOLAR MAGNETIC ANOMALY



MULTICOMPONENT MAGNETIC ANOMALY

Figure 19. Hypack magnetic data screen showing the four types of magnetic signals usually seen during a magnetic survey

commonly associated with single source anomalies, with the dipole usually aligned along the axis of the magnetic field and the negative peak of the anomaly falling nearest the north pole.

Especially important for archeological surveys are multi-component anomalies. Multi-component or complex signature anomalies consist of both dipolar and monopolar magnetic perturbations associated with a large overall deflection that can be indicative of the multiple individual ferrous materials comprising the debris patterns typically associated with shipwrecks. The complexity of the signature is affected partially by the distance of the sensor from the debris and the quantity of debris. If the sensor is close to the wreck, the signature will be multi-component, if far away, it may appear as a very broad single source signature.

Acoustic Imaging. Over the course of the past 25 years, the combined use of acoustic (sonar) and magnetic remote sensing equipment has proven to be the most effective method of identifying submerged cultural resources and assessing their potential for further research (Hall 1970; Green 1990). When combined with magnetic data, the near photographic-quality acoustic records produced by side scan sonar systems, and the lower resolution sub-bottom profilers have left little doubt regarding the identifications of some targets that are intact shipwrecks. For targets lacking structural integrity or those partially buried beneath bottom sediments, identification can be extremely difficult, but the ability of the sub-bottom profiler to image within the sediment structures allows some of these difficulties to be lessened. Because intact and exposed wrecks are less common than broken and buried wrecks, remote sensing surveys generally produce acoustic targets that require ground-truthing by divers to determine their identification and historic significance.

An Imagenex color imaging digital side scan sonar system was utilized continuously during the Calcasieu River survey to produce sonograms of the river bottom on each transect within the project area. The Imagenex system consisted of a Model 858 processor coupled with a Model 855 dual transducer tow fish operating at a frequency of 330 kHz. The sonar was set at a range of 90 ft per channel, which yielded overlapping coverage of the study areas. Sonar data were recorded in a digital format on a 270 megabyte 3.5 in SyQuest cartridge. A stream of time-tags was attached continuously to the sonar data to assist in post-processing correlation of the acoustic and magnetic data sets. Acoustic images were displayed on a VGA monitor as they were recorded during the survey, and an observation log was maintained by the sonar technician to record descriptions of the anomalies and the times and locations associated with each target. Potential targets were inventoried both during the survey and in post-processing.

In addition to the side scan sonar, an Imagenex color imaging digital sub-bottom profiler was used continuously during the survey to produce sonograms of the sedimentary structure, and any features buried within the top 16.40-ft (4 m) of sediments. The Imagenex sub-bottom profiler consisted of a Model DF 1030 sensor head operating at 10 – 30 kHz (continuous transmission frequency modulated), with a 20-degree conical beam range of 16.4 - 164.04 ft (5 m to 50 m). The low frequency and modulation of the acoustic energy allowed modest penetration into the sediment with medium resolution of objects buried within. The sub-bottom data was transmitted to a Pentium Computer for processing and time tag placement. Acoustic images from the sub-bottom profiler were displayed on an active matrix color LCD screen (800x600 pixels), as they were stored on the laptop's 1.2-gigabyte drive. The sonar technician monitored all data collected and any anomalies were logged in the field notes for later examination.

The methodologies employed during the survey produced favorable results, with reliable DGPS signals, low noise levels on the magnetometer, and clear acoustic images from both sonar

devices. All positioning and remote sensing equipment performed reliably throughout the survey. Regular and evenly spaced coverage of the entire survey area was achieved.

Survey Control and Correlation of Data Sets. The *Hypack* survey software provided the primary method of control during the survey. Survey lanes were planned in *Hypack*, geodetic parameters were established, and instruments were interfaced and recorded through the computer software. During the survey, the planned survey lines were displayed on the computer screen, and the survey vessel's track was monitored. In addition to providing steering direction for the helmsman, *Hypack* allowed the surveyors to monitor instruments and incoming data through additional windows on the survey screen.

All remote sensing data were correlated with DGPS positioning data and time through *Hypack*. Positions for all data then were corrected through the software for instrument layback and offsets. Positioning was recorded using Louisiana South State Plane grid coordinates, referencing the North American Datum of 1983 (NAD-83). The GRS-1980 ellipsoid was used, along with a Lambert projection.

Remote Sensing Data Analysis

Magnetic and acoustic data were analyzed in the field while they were generated, and post-processed using *Hypack* and Autodesk's *AutoCAD* (Version 14) computer software applications. These computer programs were used to assess the signature, intensity, and duration of individual magnetic disturbances, and to plot their positions within the project area.

In the analysis of magnetometer data for this survey, individual anomalies were identified and carefully examined. First, the profile of each anomaly was characterized in terms of pattern, amplitude, and duration. Magnetic data were correlated with field notes, so that deflections from modern sources, such as channel markers, could be identified. Although all anomalies with an amplitude greater than 10 gammas were given a magnetic anomaly number for reference purposes and tabulated (Table 3, 4, and 5), anomalies of larger amplitude (more than 50 gammas) and of longer duration (more than 20 seconds) generally are considered to have a higher likelihood of representing possible shipwreck remains, especially when such anomalies cluster together. Side scan sonar data were examined for anomalous acoustic targets and shadows that might represent potentially significant submerged cultural resources (Table 6), and to correlate with any magnetic anomalies. Sub-bottom profile data were examined for any acoustic anomalies (sediment packet breaks, faulting, linear features, gas pockets, and strong reflectors), within the sedimentary structure that may represent buried resources (Table 7, 8, and 9), and correlation with any magnetic, or side scan anomalies.

Anom #	LINE #	Duration	Start	End	Signature	Gamma	X	Y	Correlation
M1	6	15 sec	13:14:52	13:15:07	Neg	400	2689061.7	644711	pipeline
M2	5	16 sec	13:19:19	13:19:35	Neg	538.4	2689070.9	644718.7	pipeline
M3	4	18 sec	13:24:49	13:25:07	Pos	33.6	2689006.4	644481.4	
M4	4	10 sec	13:25:49	13:25:59	Pos	245.2	2689098	644701.9	pipeline
M5	3	10 sec	13:34:51	13:35:01	Pos	34.6	2688999.7	644477.5	
M6	3	24 sec	13:35:33	13:35:57	Pos	611.4	2689115.3	644704.1	pipeline/SB3

TABLE 3. INVENTORY OF MAGNETIC ANOMALIES FROM THE CALCASIEU RIVER SALTWATER BARRIER REMOTE SENSING SURVEY BLOCK 1

Line #	Anom #	Duration	Start	End	Signature	Gamma	X	Y	Correlations
4	10	10 sec	15:33:08	15:33:18	Dipole	2.8	2688078.1	641814.3	
4	11	10 sec	15:33:56	15:34:06	Pos	3.6	2687908.7	641802.5	
5	8	10 sec	15:08:58	15:09:08	Pos	4.2	2688079.9	641814.1	
5	9	10 sec	15:10:00	15:10:28	Dipole	5.6	2687806.2	641868.6	
6	7	34 sec	15:05:18	15:04:44	Dipole	11.2	2687785.8	641865.1	

TABLE 4. INVENTORY OF MAGNETIC ANOMALIES FROM THE CALCASIEU RIVER SALTWATER BARRIER REMOTE SENSING SURVEY BLOCK 2

Anom #	Run #	Duration	Start	End	Signature	Gamma	X	Y	Correlation
M12	1	58 sec	9:39:54	9:40:52	Multi	258.2	2690629.6	643975.4	
M13	1	32 sec	9:48:12	9:48:44	Neg	32.4	2689271.5	643333	
M14	1	84 sec	9:50:24	9:51:48	Neg	12.4	2689017.9	642702.6	bulkhead/A10
M15	1	18 sec	9:54:08	9:54:26	Multi	381.2	2688631.2	642081.2	pipeline/A11
M16	2	26	10:11:08	10:11:34	Pos	217.8	2690613.3	643969.3	A12/A13
M17	2	28 sec	10:19:00	10:19:28	Pos	16.8	2689294.8	643309.6	bulkhead
M18	2	22 sec	10:24:34	10:24:56	Neg	994.2	2688629.8	642057.8	pipeline
M19	3	34 sec	10:37:28	10:38:02	Pos	211.8	2690600	643964.1	
M20	3	6 sec	10:50:30	10:50:36	Neg	1115.4	2688641.8	642053.1	pipeline
M24	4	34 sec	11:05:48	11:06:22	Pos	24.4	2690588.3	643952.4	
M25	4	26 sec	11:19:40	11:20:06	Dipole	486	2688681	642028.8	pipeline
M26	5	4.0 sec	11:45:12	11:45:16	pos	8	2688836.5	642188.6	
M27	5	30 sec	11:45:48	11:46:18	Neg	75	2688685.2	642008.6	pipeline
M28	6	44 sec	12:15:32	12:16:00	Dipole	5.2	2689378.6	643225.6	
M29	6	36 sec	12:20:28	12:21:04	Dipole	129.2	2688715.2	641980.9	pipeline
M30	7	52 sec	12:46:43	12:47:35	Dipole	91.2	2688738	641980.3	pipeline

TABLE 5. INVENTORY OF MAGNETIC ANOMALIES FROM THE CALCASIEU RIVER SALTWATER BARRIER REMOTE SENSING SURVEY BLOCK 3

**TABLE 6. INVENTORY OF ACOUSTIC ANOMALIES FROM THE
CALCASIEU RIVER SALT WATER BARRIER
REMOTE SENSING SURVEY**

Anom. #	Area	Line #	Date	Time	Disk #/%	Offset	Description	Correlations
A1	1	5	12/14/98	13:49:07 to 13:49:27	1/12%	134.8 to 69.8 ft port/starboard	narrow linear anomaly extending across sonar swath on both sides	pipe line and support structures
A2	3	1	12/15/98	9:40:00 to 9:40:10	1/26%	58.0 to 61.0 ft starboard	narrow linear anomaly casting approximately 8 ft shadow	
A3	3	1	12/15/98	9:40:16 to 9:40:22	1/26%	50.4 to 53.4 ft starboard	narrow linear anomaly casting approximately 7 ft shadow	
A4	3	1	12/15/98	9:41:07 to 9:41:18	1/26%	68.0 to 102.0 ft starboard	series of 4 cylindrical anomalies extending from bottom to water surface	possible tree stumps
A5	3	1	12/15/98	9:41:51 to 9:41:58	1/27%	75.1 to 95.6 ft starboard	narrow linear anomaly extending out from near shoreline	possible log
A6	3	1	12/15/98	9:42:03 to 9:42:05	1/27%	58.6 to 62.2 ft starboard	small cylindrical anomaly extending from bottom to surface of water	
A7	3	1	12/15/98	9:43:43 to 9:43:50	1/27%	31.7 to 82.7 ft starboard	narrow linear anomaly extending out from near shoreline	possible log
A8	3	1	12/15/98	9:46:35 to 9:46:42	1/28%	72.1 to 77.4 ft starboard	rectangular shaped anomaly approximately 46 ft from shoreline.	
A9	3	1	12/15/98	9:46:47 to 9:47:08	1/28%	83.8 to 134.9 ft starboard	cluster of irregularly shaped small anomalies casting small shadows.	Possible tree branches

Anom. #	Area	Line #	Date	Time	Disk #/%	Offset	Description	Correlations
A10	3	1	12/15/98	9:50:49 to 9:51:34	1/30%	64.5 to 106.1 ft	casting small shadows. series of narrow, linear anomalies running parallel to shoreline	possible bulkhead/retaining wall structure associated with petroleum industry
A11	3	1	12/15/98	9:54:00 to 9:54:11	1/31%	73.3 to 131.8 ft port/starboard	narrow linear anomaly extending from shoreline across entire sonar swath	PIPELINE M15
A12	3	2	12/15/98	10:10:56 to 10:11:06	1/33%	73.3 to 79.7 ft starboard	narrow linear anomaly casting shadow of approx. 9 ft	M16
A13	3	2	12/15/98	10:11:12 to 10:11:40	1/33%	56.9 to 102.0 ft starboard	cluster of narrow linear anomalies scattered through area	possible logs and tree branches M16
A14	3	2	12/15/98	10:12:33 to 10:12:40	1/33%	69.2 to 99.1 ft starboard	narrow linear anomaly extending from near shoreline	possible log

Anom #	Block 1	Line	Start	End	Depth	Correlation
	1	1		Not run too shallow		
	1	2		Not run too shallow		
SB1	1	3	13:26:41	13:28:47	4.76 m	M6
SB2	1	4	13:18:45	13:18:50	5.36	pipeline
SB3	1	5	13:41:15	13:41:25	9.1	
SB4	1	6a	13:35:30	13:35:48	9.4	pipeline
SB5	1	7	13:05:05	13:05:24	10.4	pipeline

**TABLE 7. INVENTORY OF SUB-BOTTOM ANOMALIES FROM
THE CALCASIEU RIVER SALT WATER BARRIER REMOTE
SENSING SURVEY BLOCK 1**

Anom #	Block 2	Line	Start	End	Depth	Correlation
		1	Not run due to shallow water			
		2	Not run due to shallow water			
		3	Not run due to shallow water			

**TABLE 8. INVENTORY OF SUB-BOTTOM ANOMALIES FROM
THE CALCASIEU RIVER SALT WATER BARRIER REMOTE
SENSING SURVEY BLOCK 2**

Anom #	Block #	Line #	Start	End	Depth	Correlation
SB6		1	9:37:37	9:37:39	4.4 m	water-cut channel,
						possible saltwater
						channel
SB7		2	10:01:08	10:01:49	3.72 m	wreck just outside survey
						area
SB8		2	10:08:19	10:08:42	4.08 m	water-cut channel,
						possible saltwater
						channel
SB9		2	10:17:16	10:17:20	3.08 m	Gas line
SB10		6	12:13:29	12:13:33	9.2 m	Gas line

**TABLE 9. INVENTORY OF SUB-BOTTOM ANOMALIES FROM
THE CALCASIEU RIVER SALT WATER BARRIER REMOTE
SENSING SURVEY BLOCK 3**

CHAPTER VII

SURVEY RESULTS

The following discussion presents the results of the Phase I Archeological Study for the Calcasieu River Saltwater Barrier Repair Project. First, a general overview is provided, followed by a description of the anomalies located in the survey area. Figure 17 shows the spatial distribution of the magnetic anomalies. As noted above, the anomalies were identified initially by the reading of individual trackline data sets, rather than contouring; however, contours were produced and analyzed for those targets that may be impacted by the Calcasieu River Saltwater Barrier Repair Project.

General Overview of the Survey Results

A total of 30 magnetic anomalies (Tables 3, 4, and 5) were detected during the Calcasieu River survey. A total of 14 acoustic anomalies (Table 6) were recorded; 4 of these had corresponding magnetic data. The sub-bottom profiler (SBP) produced 10 acoustic anomalies (Tables 7, 8, and 9), of which one corresponded with the magnetic records. All of the acoustic anomalies appeared to be either natural debris such as submerged trees and logs, or modern man-made debris that has washed into the river, fallen off vessels, or has been discarded.

In the following discussion, five magnetic clusters, or targets are described. An assessment of each target's potential for representing a significant submerged cultural resource is presented and management recommendations for these potential resources are provided. Individual magnetic anomalies are quantified in Tables 3, 4, and 5. In considering these anomalies, water depth, lane spacing, magnetic deflection, duration of deflection, and proximity to observed manmade structures were all taken into account.

Target #1

Target #1 consists of six magnetic anomalies (Figure 20); M1 has a medium duration of 15 seconds with a high amplitude of 400 gammas, and a negative monopolar signal, M2 has a medium duration of 16 seconds with a high amplitude of 538.4 gammas, and a negative monopolar signal, M3 has a medium duration of 18 seconds with a low amplitude of 33.6 gammas, and a positive monopolar signal, M4 has a medium duration of 10 seconds with a high amplitude of 245.2 gammas, and a positive monopolar signal, M5 has a medium duration of 10 seconds with a low amplitude of 34.6 gammas, and a positive monopolar signal, M6 has a medium duration of 24 seconds with a high amplitude of 611.4 gammas, and a positive monopolar signal with a corresponding SBP anomaly (Figure 23). The magnetic contour study of Target #1 indicates that this is a series of magnetic anomalies associated with the crushed stone anchors and petroleum pipeline-transiting Block 1 (Figures 21, 22, and 23). Based upon this information, we conclude that this target is not indicative

of a submerged cultural resource; however, it may be prudent to avoid this area, for environmental reasons.

Target #2

Target #2 (Figure 24) comprises five magnetic disturbances: M7, M8, M9 and M10, and M11. M7 has a long duration of 34 seconds with low amplitude of 11.2 gammas, and a dipolar signal. M8 has a medium duration of 10 seconds with low amplitude of 4.2 gammas, and a positive monopolar signal. M9 has a medium duration of 10 seconds with low amplitude of 5.6 gammas, and a dipolar signal. M10 has a medium duration of 10 seconds with low amplitude of 2.8 gammas, and a dipolar signal. M11 has a medium duration of 10 seconds with low amplitude of 3.6 gammas, and a positive monopolar signal. A contour study of Target #2 indicates that the anomaly cluster is ferrous debris associated with the abandoned well head and piping found adjacent to Block 2. Therefore, no further work is recommended.

Target #3

Target #3 (Figure 25) consists of seven magnetic perturbations. M15 has a medium duration of 18 seconds with a high amplitude of 381.2 gammas, and a multi-component signal. M18 has a medium duration of 22 seconds with a high amplitude of 994.2 gammas, and a negative monopolar signal. M20 has a short duration of 6.0 seconds with high amplitude of 1115.4 gammas, and a negative monopolar signal. M25 has a medium duration of 26 seconds with high amplitude of 486 gammas, and a dipolar signal. M27 has a medium duration of 30 seconds with medium amplitude of 75.0 gammas, and a negative monopolar signal. M29 has a long duration of 36 seconds with high amplitude of 129.2 gammas, and a dipolar signal. M30 has a long duration of 52 seconds with medium amplitude of 91.2 gammas, and a dipolar signal. Target #3's contour plot indicates a long linear feature associated with the high-pressure gas line that crosses the survey block in this area (Figures 26 and 27). No further study of this target area is recommended; however, it will be prudent to avoid this area, for obvious safety reasons.

Target #4

Target #4 includes three magnetic anomalies: M13, M17, and M28 (Figure 28). M13 has a long duration of 32 seconds with low amplitude of 32.4 gammas, and a negative monopolar signal. M17 has a medium duration of 28 seconds with medium amplitude of 16.8 gammas, and a positive monopolar signal. M28 has a long duration of 44 seconds with low amplitude of 5.2 gammas, and a dipolar signal. The nature of the long duration and low amplitude indicates some form of geologic anomaly or dispersed anomaly, coupled with isolated ferrous debris. In close proximity to this target cluster is an old wooden bulkhead running along the left descending bank (Figures 29). The hardware associated with the bulkhead maybe the source of the low amplitude disturbance recorded in this location. Consequently, this target does not appear to represent a submerged resource; no further work is warranted or recommended.

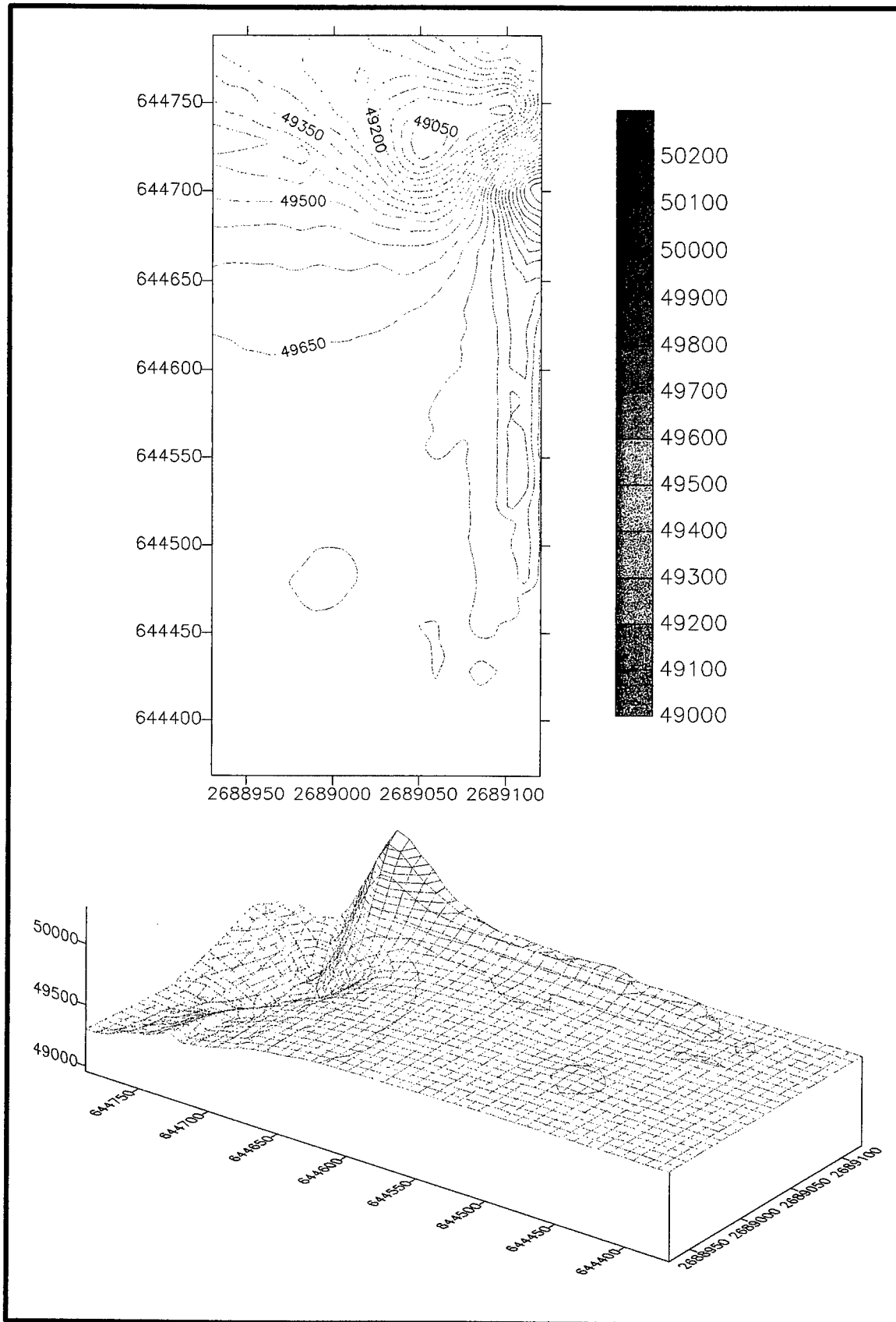


Figure 20. Block#1, Target #1 magnetic anomaly contour map showing dipolar anomaly associated with pipeline crossing

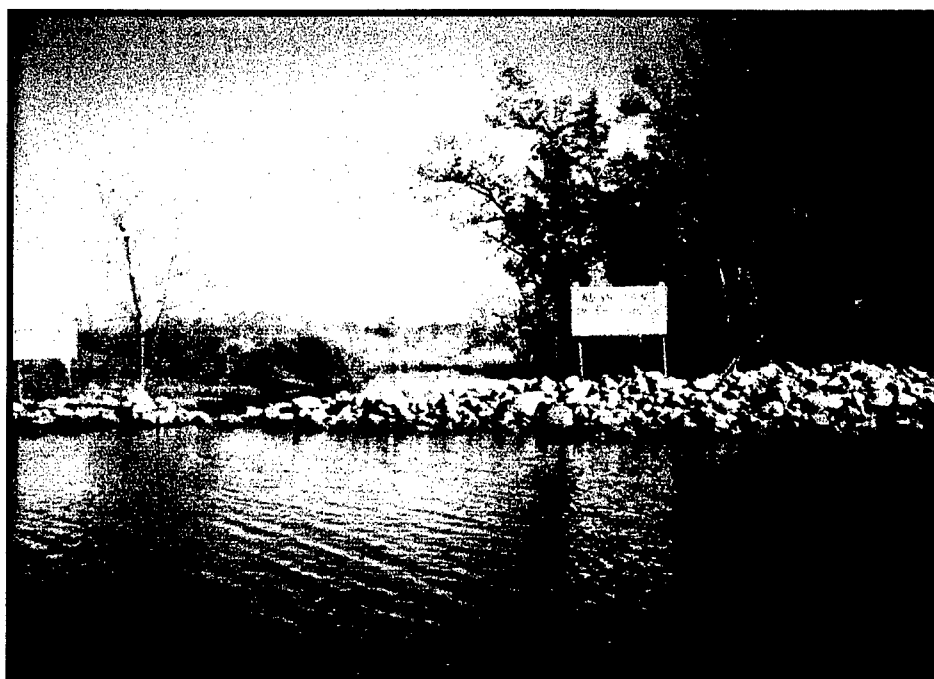


Figure 21. Block #1, shoreline showing the breach in the saltwater barrier and sign indicating a pipeline crossing

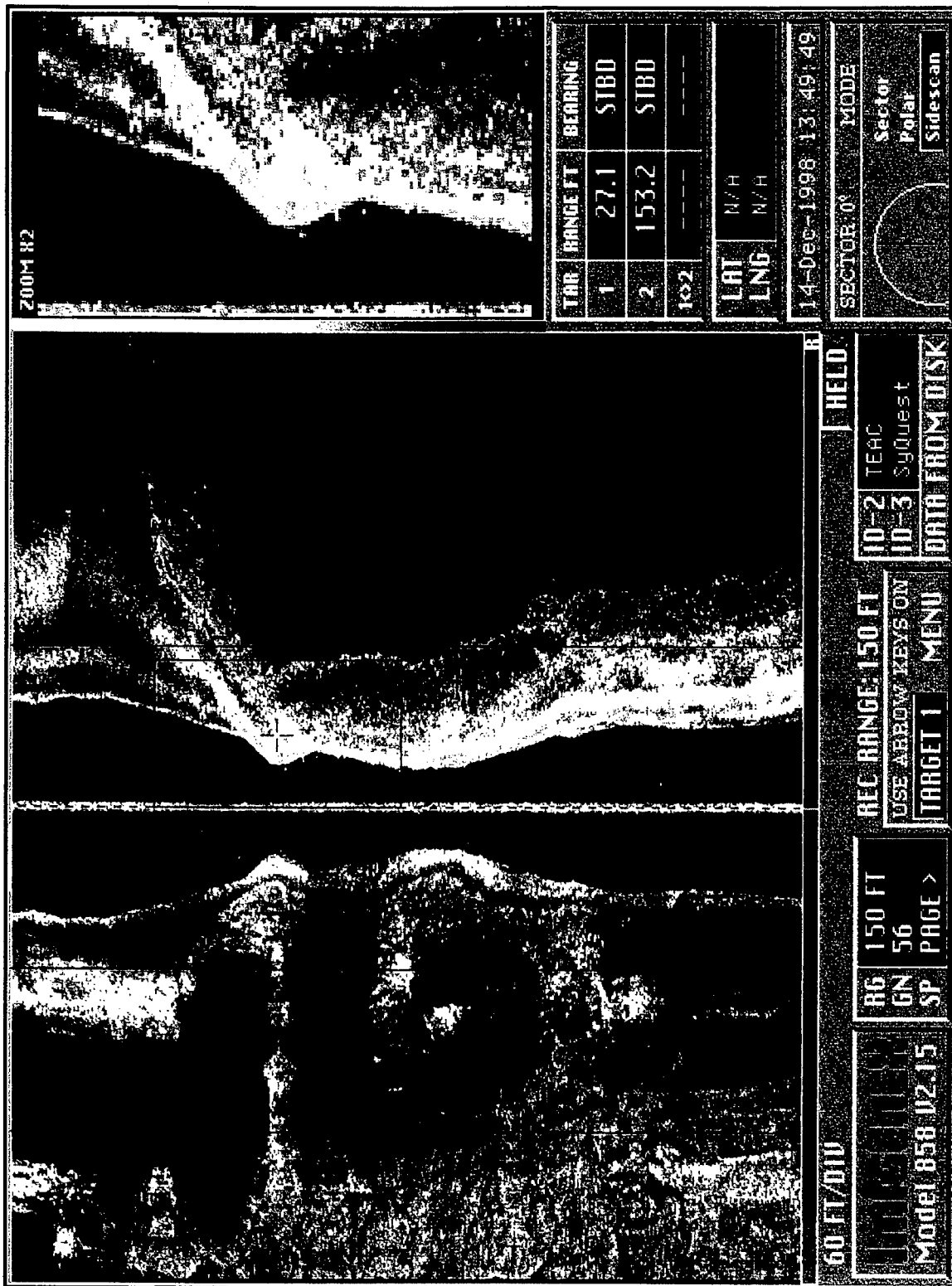


Figure 22. Block #1 Side Scan Sonar image showing rock armor over pipeline crossing. Upper right hand corner of image is a zoomed image of the rock armor

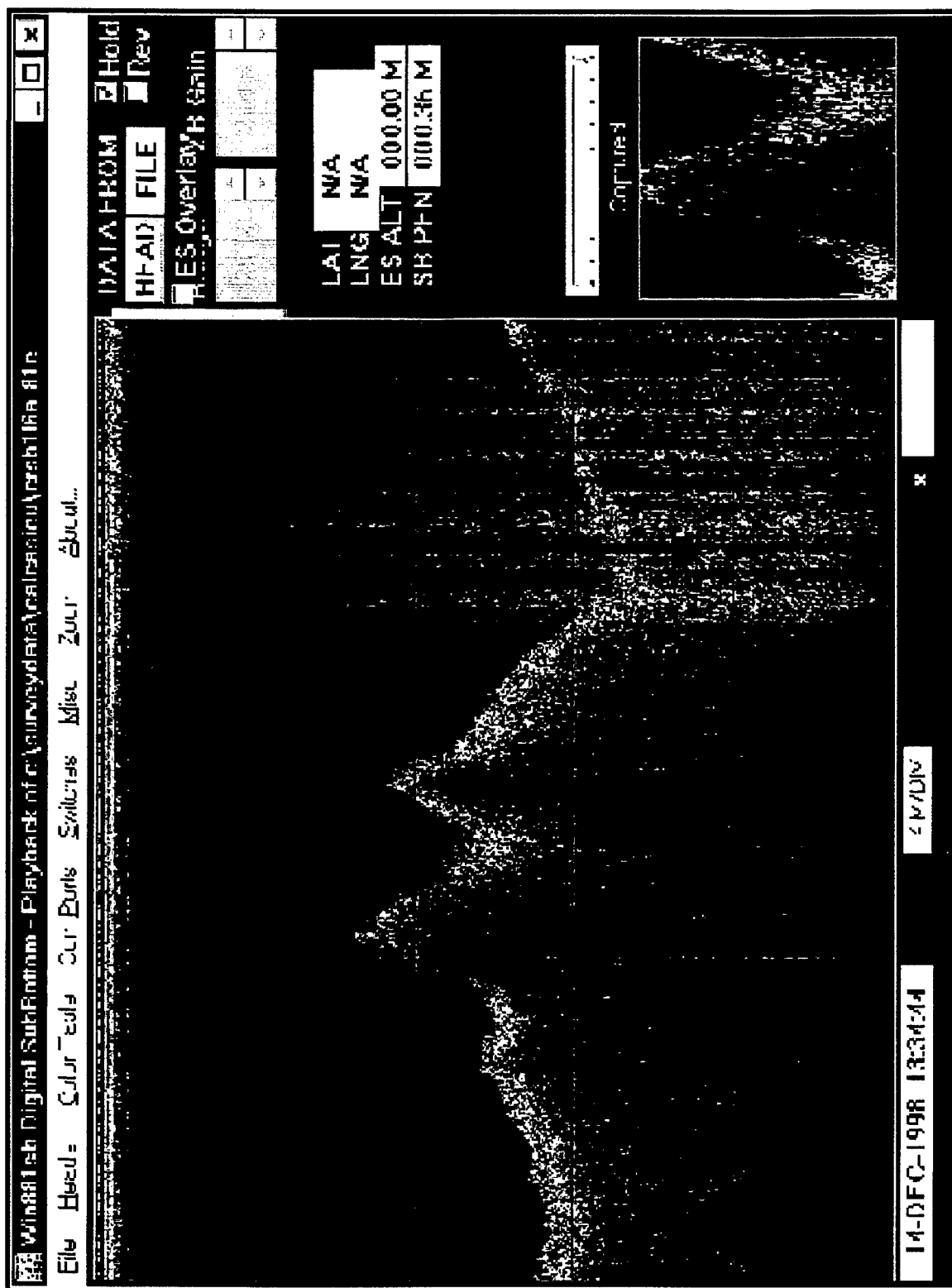


Figure 23. Block #1 Sub-bottom Profile image of pipeline trench and rock cap associated with pipeline crossing Block#1

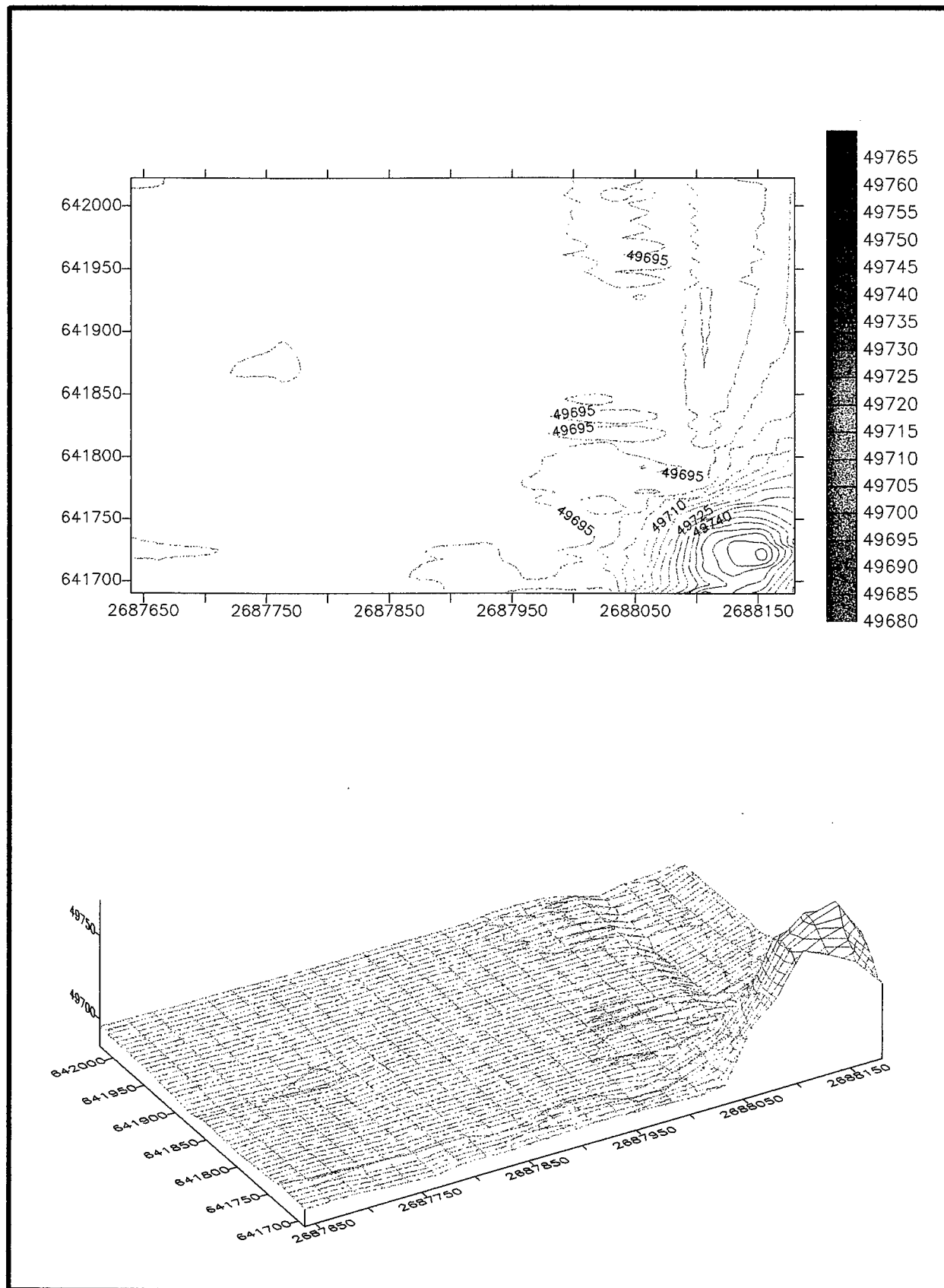


Figure 24. Target #2, Block #2, magnetic anomaly contour map showing large isolated monopolar anomaly

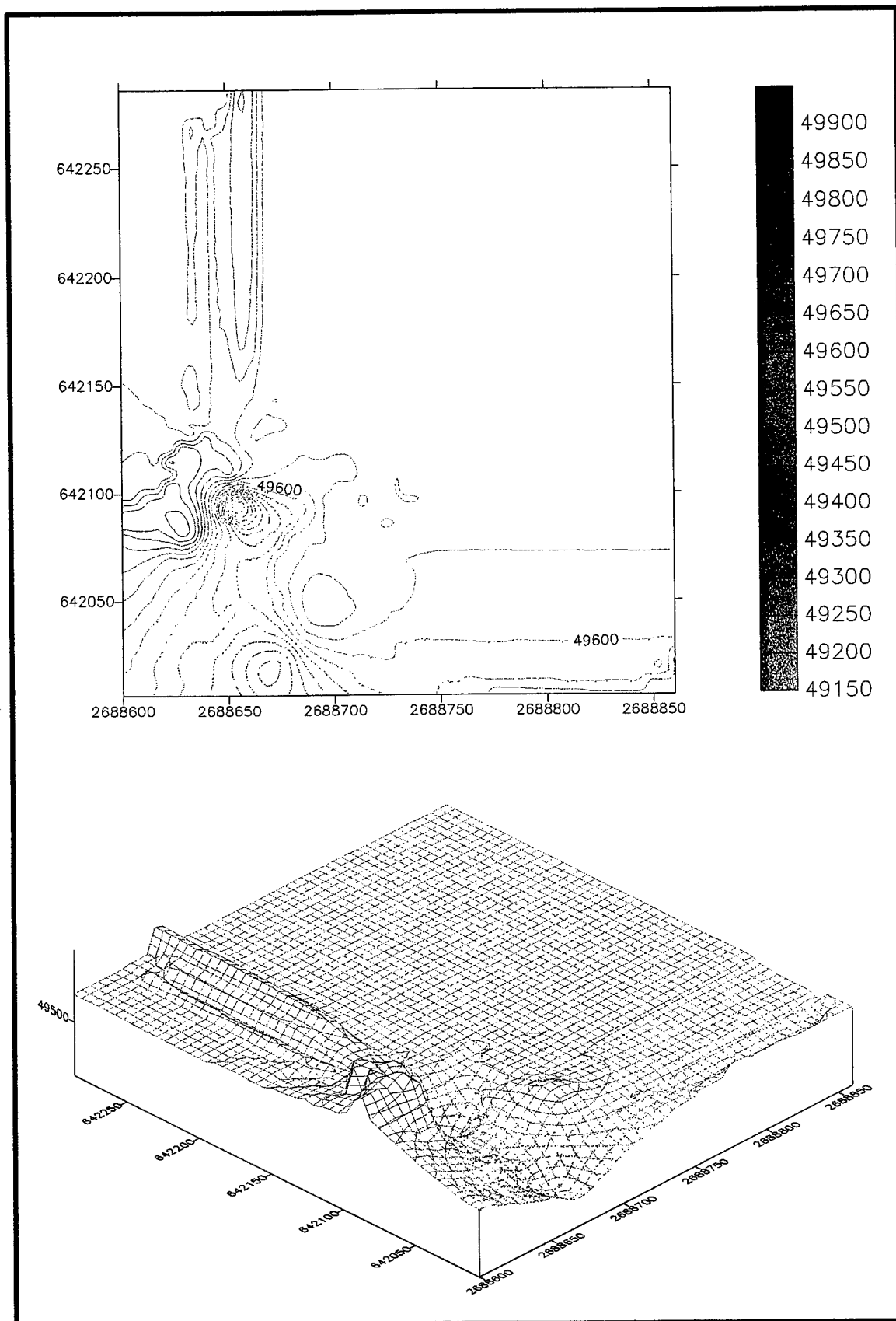


Figure 25. Block #3, Target #3, magnetic contour plot of pipeline crossing area showing monopolar, and dipolar anomalies

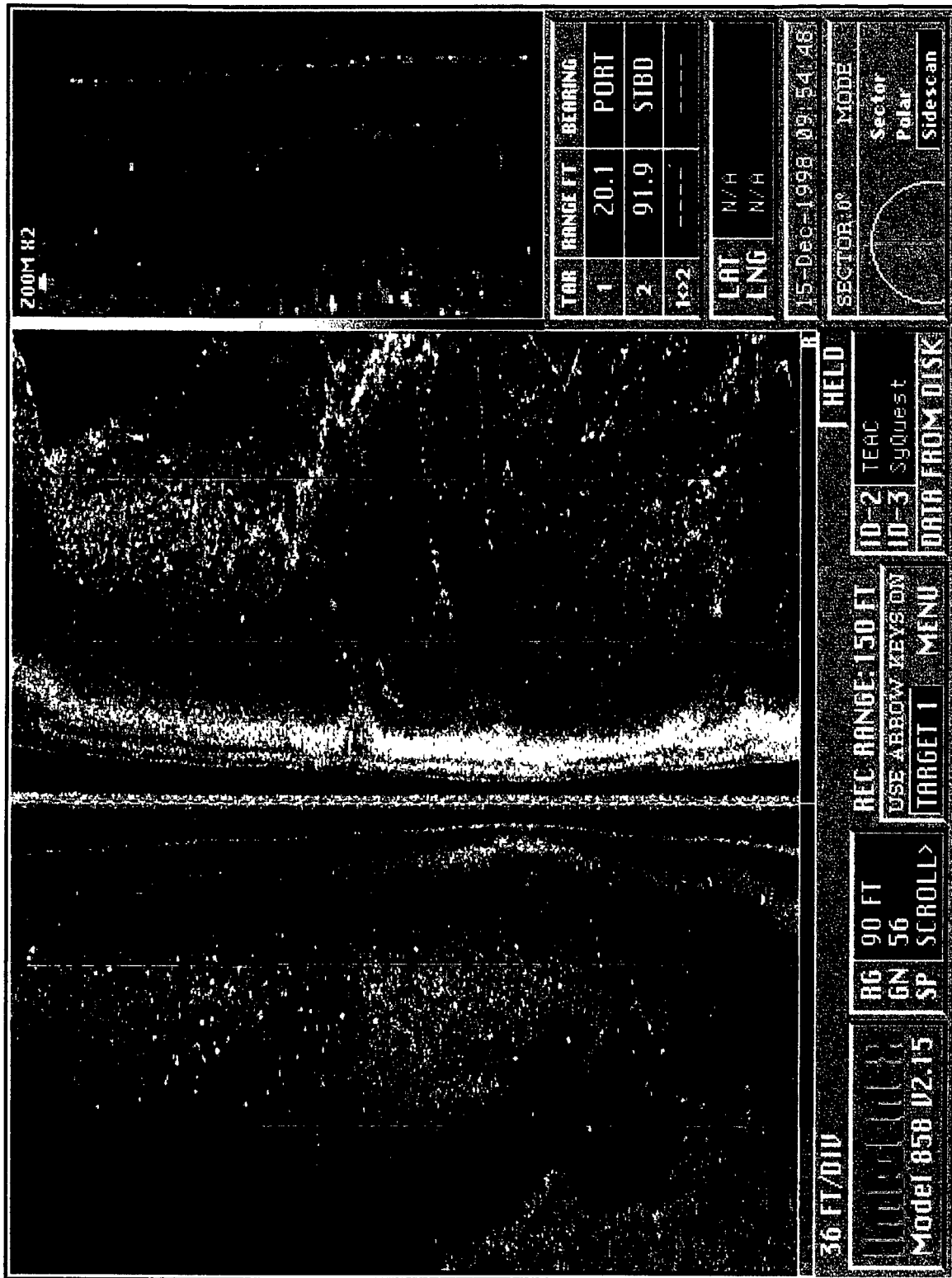


Figure 26. Side Scan Sonar image of the pipeline crossing the northern terminus of Block #3



Figure 27. Northern terminus of survey Block #3 showing signs indicating pipeline crossing and rock armor of the pipeline entry into the river channel

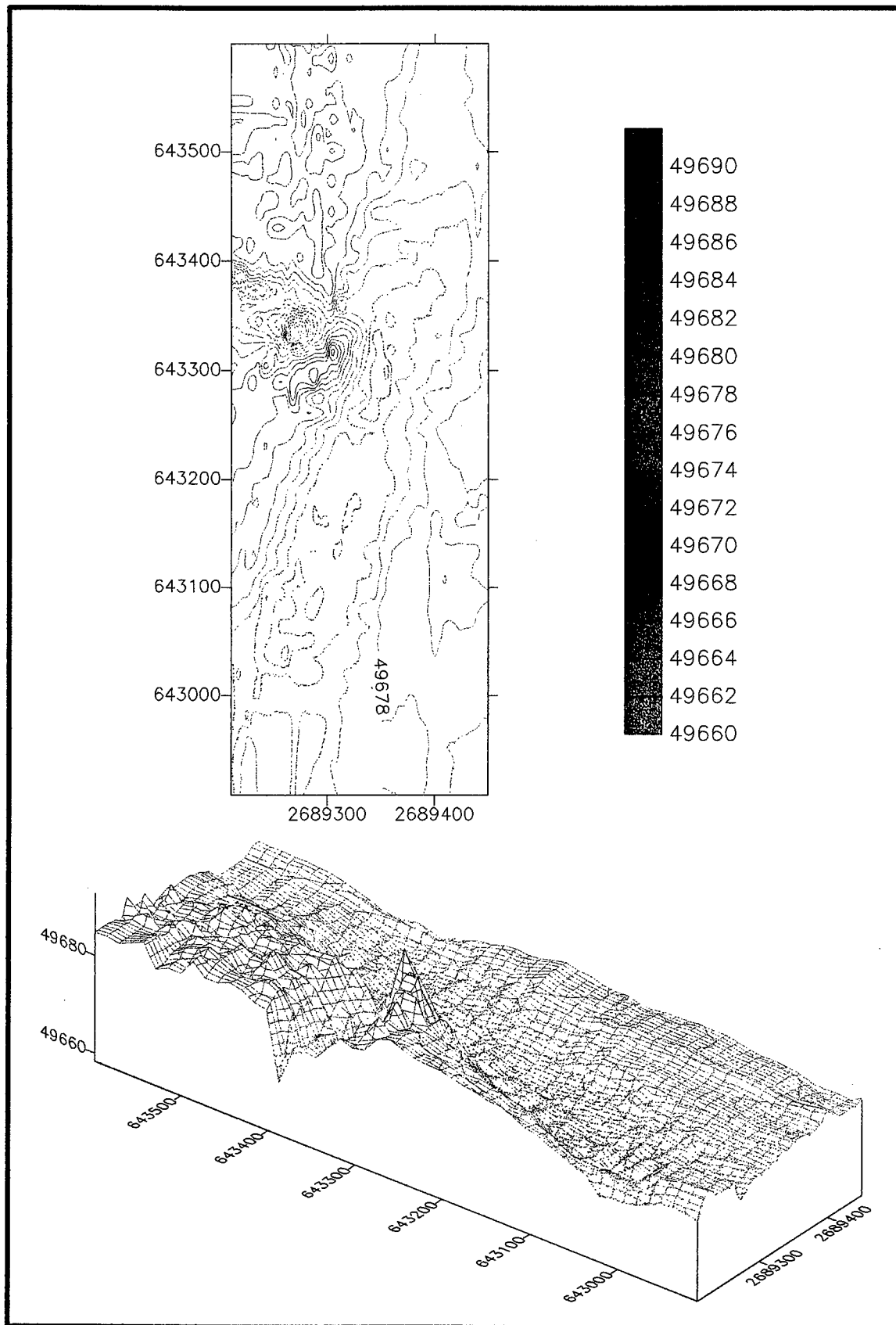


Figure 28. Block #3, Target #4, magnetic contour plot of complex magnetic anomaly with long linear trends of monopolar anomalies possibly associated with the adjacent partially submerged wooden bulkhead

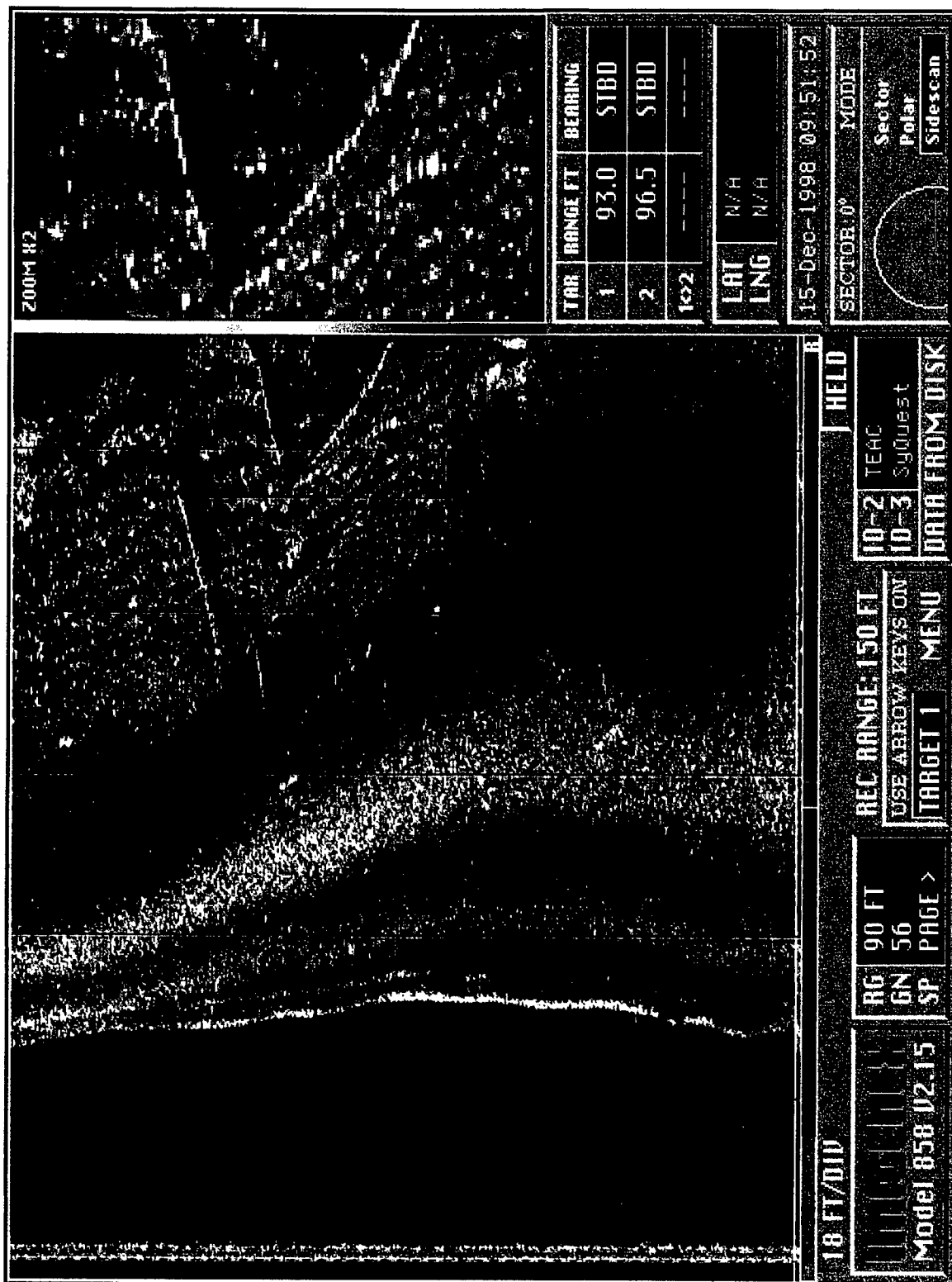


Figure 29. Side Scan Sonar image of the submerged wooden bulkhead associated with Target #4

Target #5

Target #5 (Figure 30) consists of three magnetic anomalies: M12, M16, and M19. M12 has a long duration of 58 seconds with high amplitude of 258.2 gammas, and a multi-component signal. M16 has a medium duration of 26 seconds with high amplitude of 217.8 gammas, and a positive monopolar signal. M19 has a medium duration of 34 seconds with high amplitude of 211.8 gammas, and a positive monopolar signal. The contour plot of Target #5 shows a single isolated target. No side scan anomalies, nor any conclusive sub-bottom profile anomaly was recorded in this location. It is felt that this anomaly is associated with the Charles Olmsted shipyard. This area has been used for the repairing or scraping barges and other vessels over the past 50 years, and Target #5 is more than likely ferrous scrap lost or jettisoned during this time period. Addition support of this conclusion is based in the fact that the water depth in this area was shallow, and this would enhance any magnetic anomaly signal as the sensor would be in close proximity to the ferrous source. This target does not appear to represent a submerged resource; no further work is warranted or recommended.

While working on the southern end of Block 3, adjacent to the Olmsted property, Goodwin & Associates, Inc. personnel found a shipwreck (Figures 31, 32, and 33) in approximately 30 ft (9.14 m) of water. The vessel is trending in towards the bank and comes to within 13 ft (4.0 m), of the surface. This vessel lies approximately 200 ft (60.96 m) south of the southern terminus of Block #3 (Figure 34). After speaking with the Olmsted family, we learned that this vessel was a tug lost at this site in the early 1950s, and that it was salvaged partially by a local commercial diver shortly after its loss (Charles Olmsted, personal communication 1998). We are including this data due to the close proximity of the vessel to the work area, so that the construction barges and their consorts are not damaged from anchoring in the wreck area.

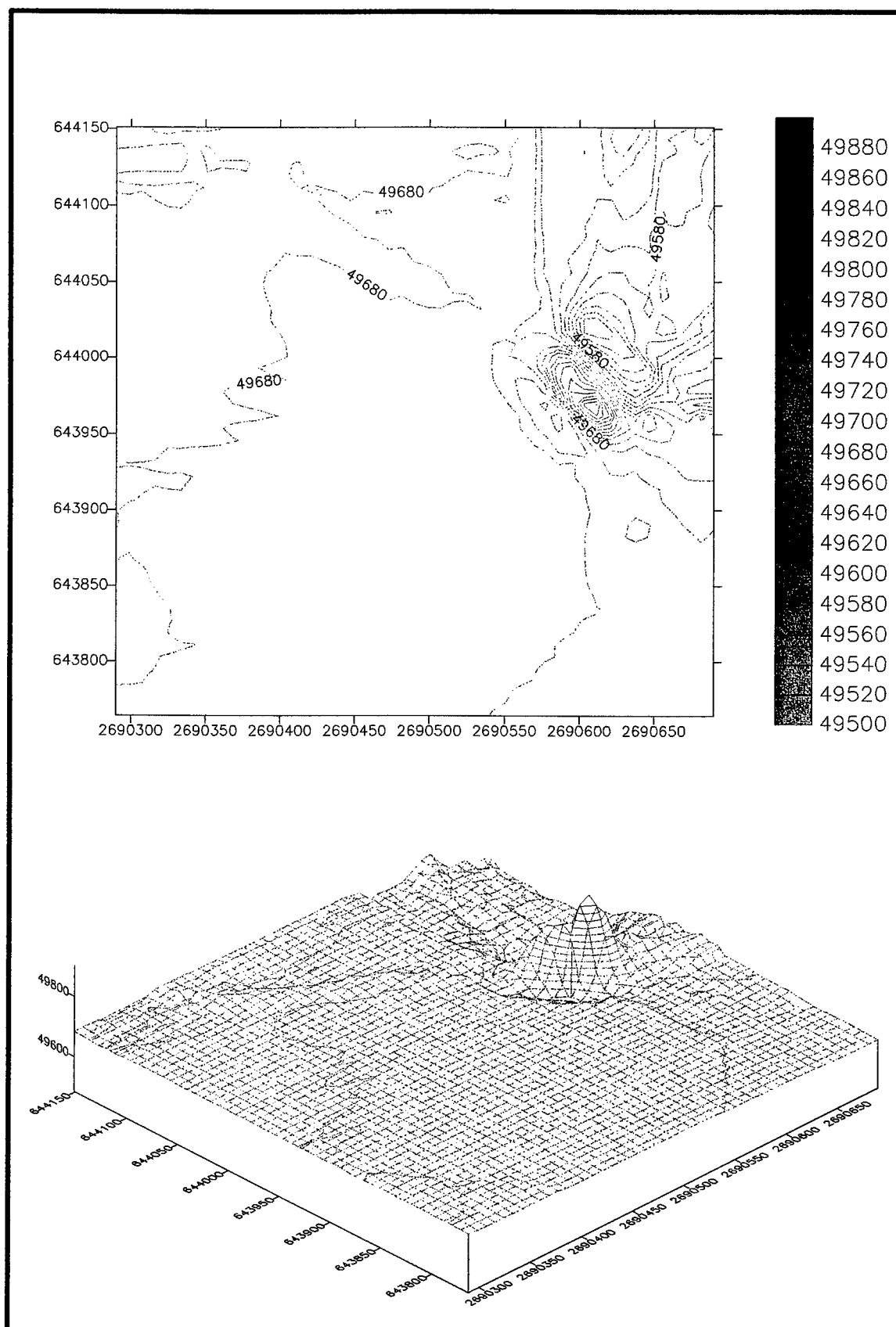


Figure 30. Block #3, Target #5, magnetic contour plot of an isolated anomaly possibly associated with the Charles Olmsted shipyard

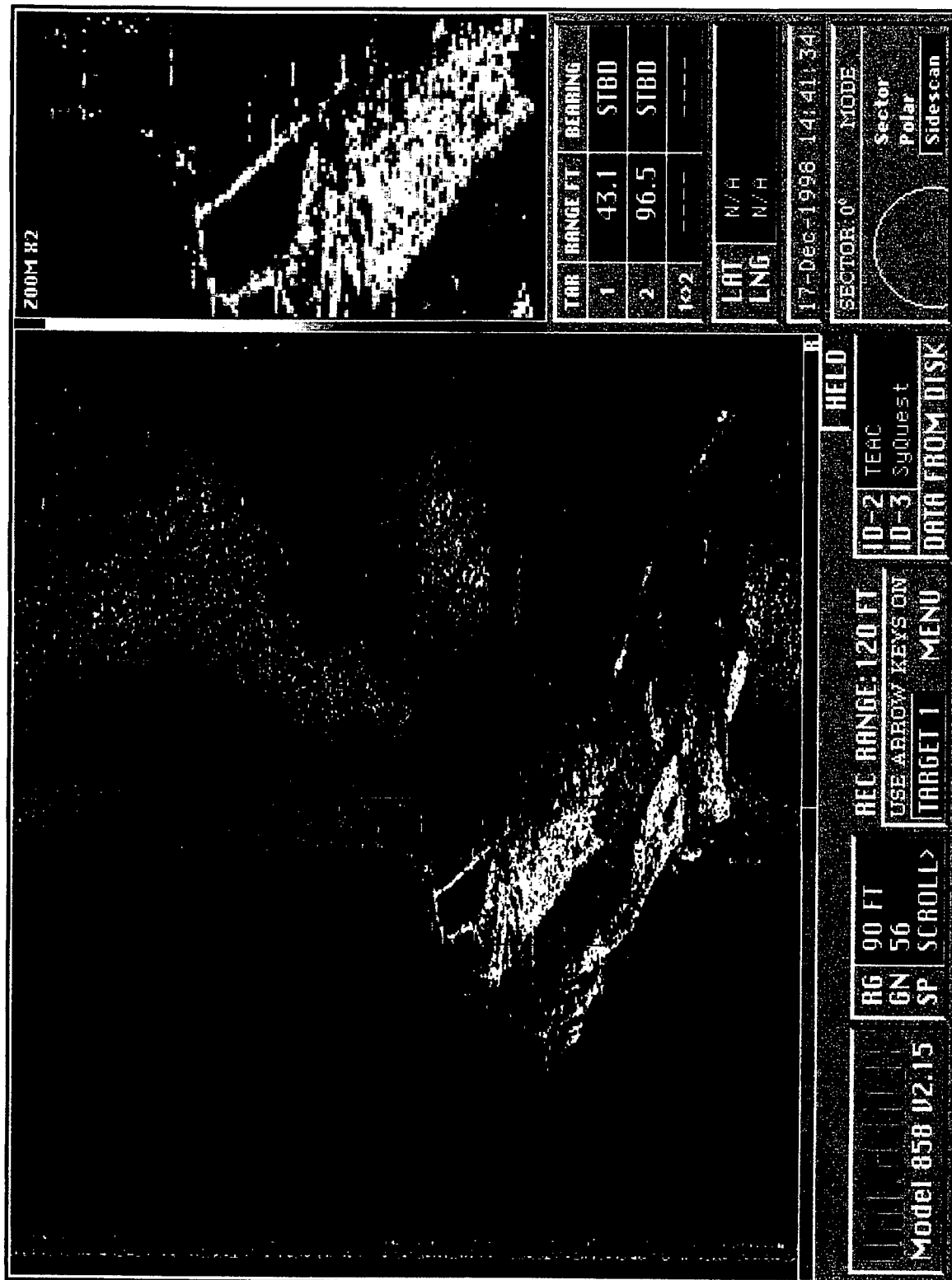
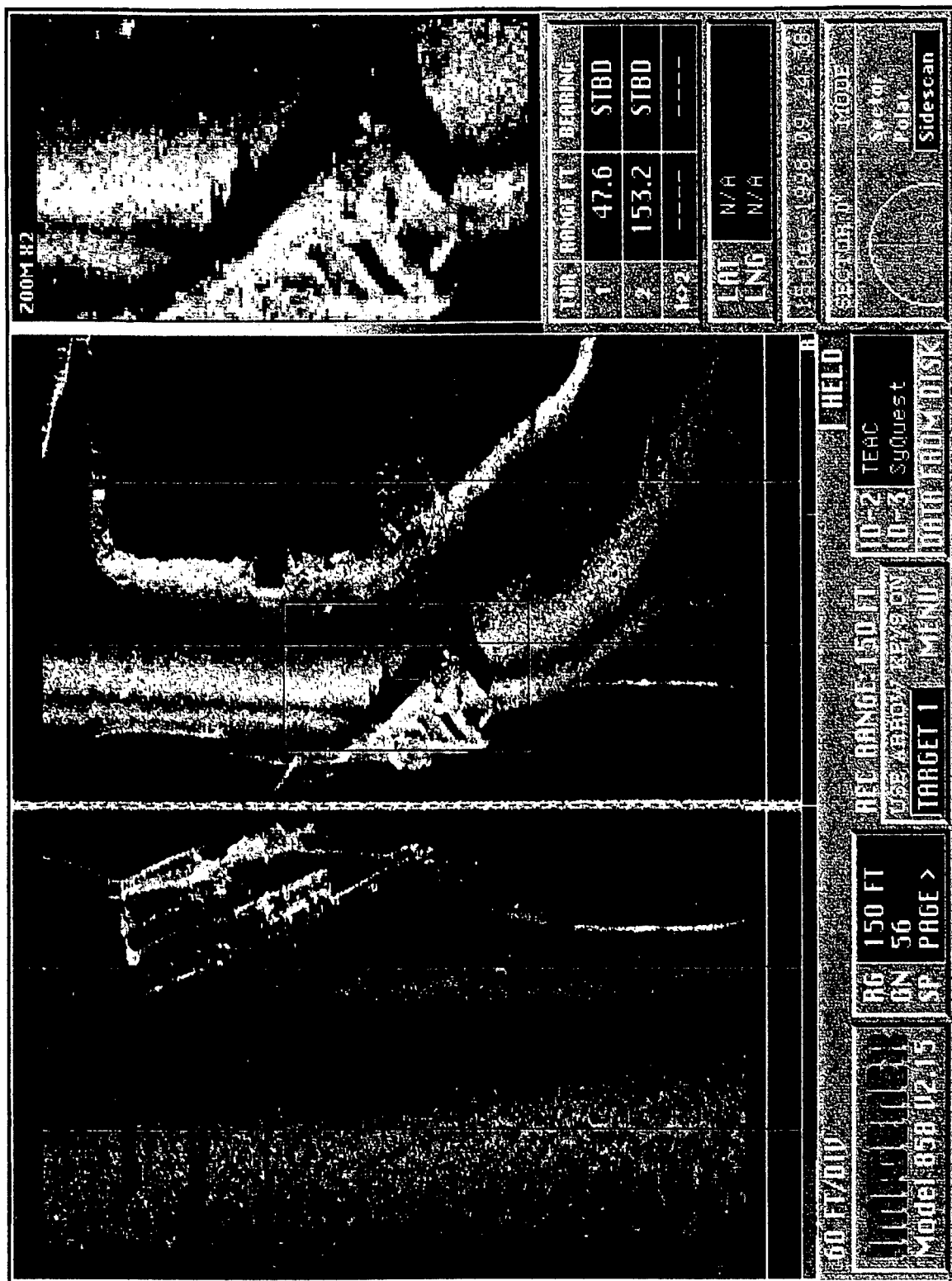


Figure 31. Color Side Scan Sonar image of shipwreck discovered at the Olmsted's shipyard. The shadows of the vessel show the relief of vessel. Note the cabin and deck structures



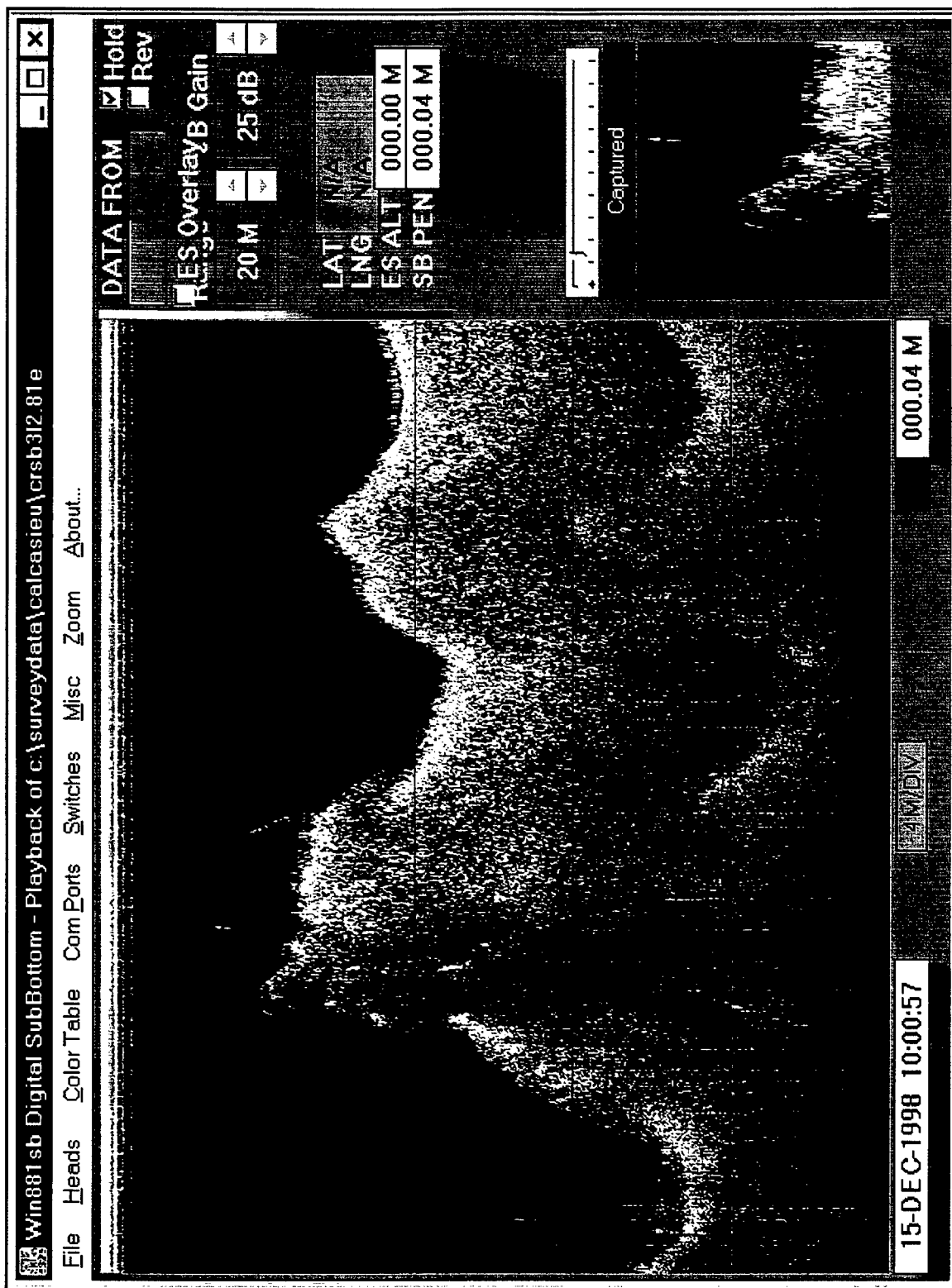


Figure 33. B/W Sub-bottom Profile image of the cross section of the shipwreck discovered during the Calcasieu river Saltwater Barrier



Figure 34. Southern terminus of Block #3, Charles Olmsted's shipyard area with several scrap barges in background, and Tug Boat wreck site in foreground

CHAPTER VIII

PROJECT SUMMARY AND MANAGEMENT RECOMMENDATIONS

This report presents the results of the Phase I Marine Archeological Remote Sensing Survey for Calcasieu River Saltwater Barrier Project, Calcasieu Parish, Louisiana. These investigations were conducted during December 1998, by R. Christopher Goodwin & Associates, Inc. on behalf of the U.S. Army Corps of Engineers, New Orleans District (USACE-NOD). The study was undertaken to assist the USACE-NOD in satisfying its responsibilities under Section 106 of the National Historic Preservation Act of 1966, as amended.

The marine remote sensing survey, utilizing side scan sonar, recording proton precession magnetometer, and a sub-bottom profiler produced 14 acoustic, 10 sub-bottom, and 30 magnetic anomalies. Analysis of these data found four correlations between acoustic and magnetic disturbances, and one correlation between sub-bottom and magnetic anomalies. However, data post processing established five magnetic target clusters. Of these targets, none appear to be in the direct impact area of the barrier repairs and none appear to represent submerged resources eligible to the National Register of Historic Places. The linear distribution pattern of Targets 1- 3 suggests that these targets are likely associated with pipelines from the petroleum industry in the survey area. Target #4 is believed to be associated with an old wooden bulkhead put in the left descending bank by the oil industry. Target #5 is isolated ferrous debris, most likely from the Olmsted's shipyard. Based on these facts and the correlative acoustic data, no further study of Targets 1- 5 is recommended. It does not appear that the proposed saltwater barrier project will effect National Register eligible properties.

The remains of a sunken tugboat were documented next to the southern end of Block #3. This site will be reported to the Louisiana State Historic Preservation Office along with any pertinent data pertaining to it's origin.

REFERENCES CITED

- Aitken, M. J.
1961 *Physics and Archeology*. Interscience, New York.
- Aten, L. E.
1983 *Indians of the Upper Texas Coast*. Academic Press, New York.
- Bergeron, Arthur W., Jr.
1989 *Guide to Louisiana Confederate Military Units, 1861-1865*. Louisiana State University Press, Baton Rouge.
- Bonnin, Jack C. and Richard A. Weinstein
1975 The Strohe Site, Louisiana Archaeological Society Newsletter 2(1):8, Baton Rouge.

1978 The Strohe Site (16JD10), Jefferson Davis Parish, Louisiana. Paper presented at the 4th Annual Meeting of the Louisiana Archaeological Society, Baton Rouge.
- Brain, Jeffery P.
1983 Paleo-Indian in the Lower Mississippi Valley. *Proceedings of the 33rd Southeastern Archaeological Conference*, Bulletins 20 and 21.

1971 The Lower Mississippi Valley in North American Prehistory. In *Arkansas Archaeological Survey*, Fayetteville.
- Brasseaux, Carl A.
1987 *The Founding of New Acadia: The Beginnings of Acadian Life in Louisiana, 1765-1803*. Louisiana State University Press, Baton Rouge.
- Breiner, Sheldon
1973 *Applications Manual for Portable Magnetometers*. Geometrics, Sunnyvale, California.
- Brookes, S. O., and C. Taylor
1986 Tchula Period Ceramics in the Upper Sunflower Region. In *The Tchula Period in the Mid-South and Lower Mississippi Valley*. Proceedings of the 1982 Mid-South Archaeological Conference. Archaeological Report No. 17, Mississippi Department of Archives and History, Jackson, Mississippi.

Broussard, James Rushton

- 1959 The Church at Lake Charles before 1902. In *The Church at Lake Charles, Louisiana, 1850's [sic] to 1910*, edited by Rev. Donald J. Hebert, pp. vii-72. Published by the editor.

Brown, Ian W.

- 1981 A Preliminary Investigation of Check Stamped Pottery in the Petite Anse Region. Lower Mississippi Survey, Petite Anse Project Research Notes 9. Peabody Museum, Harvard University, Cambridge.
- 1984 Late Prehistory in Coastal Louisiana: The Coles Creek Period. In *Perspectives on Gulf Coast Prehistory*, edited by David D. Davis, pp. 94-124. University Presses of Florida, Gainesville.
- 1985 *Natchez Indian Archaeology: Culture Change and Stability in the Lower Mississippi Valley*. Department of Archives and History Archaeological Reports, No.15.

Brown, Ian W., and Nancy Lambert-Brown

- 1978 *Archaeological Investigations at the Banana Bayou Mound (33-I-5)*. Lower Mississippi Survey, Petite Anse Project Research Notes 5. Peabody Museum, Harvard University, Cambridge.

Brown, Ian W., Richard S. Fuller, and Nancy Lambert-Brown

- 1979 *Site Survey in the Petit Anse Region, Southwest Coast, Louisiana*. Lower Mississippi Survey, Petite Anse Project Research Notes 11. Peabody Museum, Harvard University, Cambridge.

Burwell, Shirley V. (compiler)

- 1983 *Imperial Calcasieu Records, Successions 1840-1910*. Published by the author, Lake Charles, Louisiana.

Byrd, K. M.

- 1994 Tchefuncte Subsistence Practices at the Morton Shell Mound, Iberia Parish, Louisiana. *Louisiana Archaeology* 16:1-128.

Byrne, J.V., D.O. LeRoy, and C.M. Riley

- 1959 The Chenier Plain and its Stratigraphy, Southwestern Louisiana. Gulf Coast Association of Geological Societies Transactions 9:237-259.

Cagle, Robert Brantley

- 1967 Formative Years. Chapter I of *The Centennial History of Lake Charles, 1867-1967*, edited by Donald J. Millet, n.p. Lake Charles Letter Shop, Lake Charles, Louisiana.

Calcasieu Parish Planning Board [CPPB]

- 1945 *Calcasieu Parish Resources and Facilities*. State of Louisiana, Department of Public Works, Planning Division, Baton Rouge.

Caldwell, Joseph R.

- 1958 *Trend and Tradition in the Prehistory of the Eastern United States.* American Anthropological Association Memoir 88, American Anthropological Association, Washington, D.C.

Campbell, J. L., J. R. Morehead, and A. F. Servello

- 1990 *Data Recovery at 16VN791: A Multi-Component Prehistoric Site in the Birds Creek Drainage, Fort Polk Military Reservation, Fort Polk, Louisiana.* Report of Investigations No. 188, New World Research, Inc.

Cantley, C. E. and J. R. Kern

- 1984 *Cultural Resources Evaluations: Ft. Polk, Louisiana.* Submitted by Gilbert/Commonwealth Inc. to Archaeological Services Branch, National Park Service Southeast Region Office, Atlanta.

Chapman, J.

- 1977 *Archaic Period Research in the Lower Little Tennessee River Valley - 1975: Icehouse Bottom, Harrison Branch, Thirty Acre Island, Calloway Island.* Department of Anthropology, University of Tennessee Report of Investigations 18.

Chapman, J., and J. Adavasio

- 1977 Textile and Basketry Impressions from Icehouse Bottom, Tennessee. *American Antiquity* 42:620-25.

Chapman, J. and A.B. Shea

- 1981 The Archaeobotanical Record: Early Archaic Period to Contact in the Lower Little Tennessee River Valley. *Tennessee Anthropologist* 6(1):61-84.

Casey, Powell A.

- 1983 *Encyclopedia of Forts, Posts, Named Camps, and Other Military Installations in Louisiana, 1700-1981.* Claitor's Publishing Division, Baton Rouge.

Clark, Joseph L.

- 1939 *A History of Texas, Land of Promise.* D. C. Heath and Company, Boston.

Coastal Environments, Inc.

- 1984 *Cultural Resources Evaluation of the Shattuck Street Overpass Project Area, Lake Charles, Louisiana.* Coastal Environments Inc., Baton Rouge, Louisiana. Submitted to the Community Development Department, City Of Lake Charles, Louisiana.

Coleman, J.M. and H.H. Roberts

- 1991 The Mississippi River Depositional System: A Model for the Gulf Coast Tertiary. In D. Goldthwaite, ed., *An Introduction to Central Gulf Coast Geology.* New Orleans Geological Society, New Orleans.

-
- Connaway, John. M., Samuel O. McGahey, Clarence H. Webb, and Roger. T. Saucier
1977 *Teoc Creek: A Poverty Point Site in Carroll County, Mississippi*. Archaeological Report No. 3, Mississippi Department of Archives and History, Jackson, Mississippi.
- Clune, John and Karla W. Wheeler
1991 *A Database of Louisiana Shipwrecks*. Database on file at the Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Archaeology, Baton Rouge, Louisiana.
- Dance, Ray E., B. I. Griffis, B. B. Nutt, A. G. White, and S. A. Lytle
1968 *Soil Survey East Baton Rouge Parish*. U.S. Department of Agriculture, Soil Conservation Service, Alexandria, Louisiana.
- Davis, Dave D.
1984 *Protohistoric Cultural Interaction along the Northern Gulf Coast. Perspectives on Gulf Coast Prehistory*, University Presses of Florida, Gainesville, Florida.
- Davis, Dave D., John D. Harley, and Ruth Wiens Henderson
1979 *An Archaeological Survey of the Lowermost Mississippi River*, Department of Anthropology, Tulane University. Submitted to the New Orleans District, U.S. Army Corps of Engineers.
- Davis, Edwin A.
1960 *Old Imperial Saint Landry*. In *Marriage Contracts of the Opelousas Post, 1766 - 1803*, translated and abstracted by Jacqueline O. Vidrine and Winston De Ville, pp. i-viii. Manuscript on file, Louisiana Collection, Howard-Tilton Memorial Library, Tulane University, New Orleans.
- Davis, Edwin Adams
1971 *Louisiana: A Narrative History*. 3rd ed. Claitor's Publishing Division, Baton Rouge.
- DeJarnette, D. L., E. B. Kurjack, and J. W. Cambron
1962 *Stanfield-Worley Bluff Shelter Excavations*. *Journal of Alabama Archaeology* 8(1,2):1-124.
- Delcourt, P.A. and H.R. Delcourt
1981 *Vegetation maps for eastern North America: 40,000 yr B.P. to the present*. In *Geobotany II*, edited by R.C. Romans, pp. 123-165. Plenum Press, New York.
- DePratter and Howard
1980 *Evidence for a Sea Level Lowstand between 4500 and 2400 Years B.P. on the Southeast Coast of the United States*. *Journal of Sedimentary Petrology* 51:1287-1295.
- De Ville, Winston
1973 *Opelousas, The History of a French and Spanish Military Post in America, 1716 - 1803*. Polyanthos, Cottonport, Louisiana.
-

-
- 1986 *Opelousas Post: The Census of 1771*. Published by the author, Ville Platte, Louisiana.
- DuBar, J.R., T.E. Ewing, Lundelius, E.L., Jr., Otvos, E.G., and C.D. Winker
1991 Quaternary Geology of the Gulf of Mexico Coastal Plain. In R.B. Morrison, ed., Quaternary Nonglacial Geology: Conterminous U.S. Geological Society of America, Boulder, Colorado.
- Duhe, Brian J.
1976 Preliminary Evidence of a Seasonal Fishing Activity at Bayou Jasmine. *Louisiana Archaeology*, Vol. 3:33-74.(1977).
- Ensor, H. Blaine
1986 San Patrice and Dalton Affinities on the Central and Western Gulf Coastal Plain. *Bulletin of the Texas Archeological Society* 57:69-81.
- Fehrenbach, T. R.
1991 *Lone Star: A History of Texas and the Texans*. Reprinted. Wings Books, New York. Originally published 1968.
- Fisk, H.N.
1939 Depositional Terrace Slopes in Louisiana. *Journal of Geomorphology* 2(2): 181-200.

1944 Geological Investigation of the Alluvial Valley of the Lower Mississippi River. U.S. Army Corps of Engineers, Mississippi River Commission, Vicksburg, Miss.
- Fontenot, Mary Alice, and Rev. Paul B. Freeland
1976 *Acadia Parish, Louisiana: A History to 1900*. Claitor's Publishing Division, Baton Rouge.
- Ford, James A., and George I. Quimby, Jr.
1945 The Tchefuncte Culture: An Early Occupation of the Lower Mississippi Valley. *Society for American Archaeology Memoir* No. 2. Menasha, Wisconsin.
- Frank, Joseph V.
1976 The Bel Site (16CU127): Urban Archaeology in Lake Charles, Louisiana. *Louisiana Archaeology* 3:75-121.

1976 *The Bel Site: 16Cu127, Urban Archaeology in Lake Charles, Louisiana*. Southwest Louisiana Archaeological Society. Report on file at the Division of Archaeology, Office of Cultural Development, Louisiana Department of Culture, Recreation and Tourism, Baton Rouge, Louisiana.

1977 Cultural Resources Survey of the Beauregard Electric Cooperative, Inc. Moss Bluff Metering - Station Site, Moss Bluff to Ragley 69 Kv Transmission Line, Beauregard and Calcasieu Parishes, Louisiana. Submitted to Meyer and Associates and Beauregard Electric Cooperative, Inc.
-

-
- 1978a Cultural Resources Survey of the Proposed Barge Dock at AWECO Incorporated Lake Charles Refinery, Lake Charles, Louisiana, W - 110277. Submitted to Wink Incorporated.
- 1978b *Cultural Resources Survey of the Proposed Urban Development Action Grant, City of Lake Charles, Louisiana, SAI No. 78000044.* Submitted to Noel Moss, Community Development Department, City of Lake Charles, Louisiana.
- 1978c *Test Excavations at 16 CU. 140: Old Town Bay Site.* Submitted to AWECO, Inc., Dallas, Texas.
- 1978d *Cultural Resources Survey of the Wastewater Collection Facility, Lake Charles, La.* Submitted to Meyer & Associates, Inc. and Hackett & Bailey.
- 1985 *Cultural Resource Survey of Proposed Gas Line Replacement, City of Westlake, Calcasieu Parish, Louisiana, MA Project No. 2-41301.* Submitted to City of Westlake, Louisiana.
- 1990 *Cultural Resource Survey of the Proposed Federal Court Building, Lake Charles, Calcasieu Parish, Louisiana.* Submitted to International Brotherhood of Electrical Workers, Lake Charles, Louisiana.
- 1997a *Cultural Resources Survey of Proposed Construction Project on Burnett Bay, Calcasieu River, Calcasieu Parish, Louisiana.* Submitted to Nathal Sharp, Jr., Moss Bluff, Louisiana and Patrick Hay, Lake Charles, Louisiana.
- 1997b *Cultural Resources Survey of Proposed Development of a 615.8 Acre Golf Course and Multiple Use Complex, City of Westlake, Calcasieu Parish, Louisiana.* Submitted to Meyer & Associates, Inc., Sulphur, Louisiana.
- French, B. F. (editor and translator)
- 1875 *Historical Collections of Louisiana and Florida, Including Translations of Original Manuscripts Relating to Their Discovery and Settlement, with Numerous Historical and Biographical Notes.* Albert Mason, New York.
- Fuller, Richard S. and Diane Silvia Fuller
- 1987 *Archaeology at the Morgan Site Mound Complex in Southwest Louisiana, 1986.* State of Louisiana, Division of Archaeology, Office of Cultural Development, Department of Culture, Recreation and Tourism, Baton Rouge.
- Gagliano, Sherwood M.
- 1963 A Survey of Preceramic Occupations in Portions of South Louisiana and South Mississippi. *Florida Anthropologist* 16(4):105-132.
- 1970 *Archaeological and Geological Studies at Avery Island, 1968-1970.* Progress Report submitted to the International Salt Company, Project Sponsors. Baton Rouge.
-

-
- 1979 *Cultural Resources Studies in the Pearl River Mouth Area, Louisiana-Mississippi: Chef Menteur and Rigolets Passes Hurricane control Structures Orleans and St. Tammany Parishes, Louisiana.* Prepared for the U.S. Army Corps of Engineers, New Orleans District.
- Gagliano, S.M., C.E. Pearson, R.A. Weinstein, D.E. Wiseman, and C.M. McClendon
1982 *Sedimentary Studies of Prehistoric Archaeological Sites.* Prepared for U.S. Department of the Interior, National Park Service, by Coastal Environments, Inc., Baton Rouge, La.
- Gagliano, S. M., and H. F. Gregory
1965 A Preliminary Survey of Paleo-Indian Points from Louisiana. *Louisiana Studies*, 4(1):62-77. Natchitoches.
- Gagliano, Sherwood M., and Roger T. Saucier
1963 Poverty Point Sites in Southeastern Louisiana. *American Antiquity* 28:320-327.
- Gibson, Jon L., and Joseph V. Frank
1995 *Cultural Resources Survey of the Isle de Capri Development, Land Based Facilities, Westlake, Calcasieu Parish, Louisiana.* Submitted to The Gray Law Firm, Lake Charles, Louisiana.
- 1974 The Rise and Decline of Poverty Point. *Louisiana Archaeology*, No. 1:8-36.
- 1975 *Archeological Survey of Bayou Teche, Vermillion River, and Freshwater Bayou, South Central Louisiana.* University of Southwestern Louisiana, Lafayette. Submitted to the New Orleans District, U.S. Army Corps of Engineers.
- 1979 Poverty Point Trade in South Central Louisiana: An Illustration from Beau Rivage. *Louisiana Archaeology*, Vol. 4:91-116.
- 1980 Clarence Hungerford Webb and Poverty Point Archaeology. In *Caddoan and Poverty Point Archaeology: Essays in Honor of Clarence H. Webb*, edited by Jon L. Gibson. *Louisiana Archaeology* 6:29-50.
- 1984 The Troyville-Baytown Issue. *The Troyville-Baytown Period in Lower Mississippi Valley Prehistory: A Memorial to Robert Stuart Neitzel.* *Louisiana Archaeology* 9:31-64. (For 1982)
- 1985a Ouachita Prehistory. *Prehistory of the Ouachita River Valley, Louisiana and Arkansas.* *Louisiana Archaeology* 10:319-335. (For 1983)
- 1985b Mounds on the Ouachita. *Prehistory of the Ouachita River Valley, Louisiana and Arkansas.* *Louisiana Archaeology* 10:171-270. (For 1983)
- 1994 Lower Mississippi Valley Exchange at 1100 B.C., *Exchange in the Lower Mississippi Valley and Contiguous Areas in 1100 B.C.,* *Louisiana Archaeology* 17:1-11. (For 1990).
-

-
- Gibson, Jon L., and J. Richard Shenkel
1988 Louisiana Earthworks: Middle Woodland and Predecessors. In *Middle Woodland Ceremonialism in the Mid-South and Lower Mississippi Valley*. Proceedings of the 1984 Mid-South Archaeological Conference, pp. 7-18. Mississippi Department of Archives and History, Jackson.
- Goodwin, R. Christopher, Jill-Karen Yakubik, Peter Gendel, Herschel A. Franks, and Carol Poplin
1986 *Cultural Resources Survey of the Bayou Courtableau Enlargement Project, St. Landry Parish, Louisiana*. Submitted by R. Christopher Goodwin and Associates, Inc., to the U.S. Army Corps of Engineers, New Orleans District.

1986 *Archeological Testing at 16CM61, A Prehistoric Shell Midden in Cameron Parish, Louisiana*. R. Christopher Goodwin and Associate, Inc., New Orleans. Submitted to the New Orleans District, U. S. Army Corps of Engineers.
- Goodyear, Albert C.
1982 The Chronological Position of the Dalton Horizon in the Southeastern United States. *American Antiquity* 47:382-395.
- Graham, R. W., C. V. Haynes, D. L. Johnson, and M. Kay
1981 Kimmswick: A Clovis-Mastodon Association in Eastern Missouri. *Science* 213:1115-1117.
- Green, James A., Jr.
1989 Preliminary Report and Analysis of 16BE56: A Prehistoric Site on Crooked Creek, Beauregard Parish, Louisiana. *Louisiana Archaeological Society Newsletter* 16(1):7-10.
- Green, Jeremy
1990 *Maritime Archaeology: A Technical Handbook*. Academic Press, New York.
- Gregory, Hiram F., Jr.
1969 Plaquemine Period Sites in the Catahoula Basin: A Microcosm in East Central Louisiana. *Louisiana Studies*, Vol. 8, No. 2, pp. 111-34. Natchitoches.
- Griffin, J. B.
1990 Comments on the late Prehistoric Societies in the Southeast. In *Towns and Temples Along the Mississippi*, p. 5-15, D. H. Dye and C. A. Cox editors, University of Alabama Press, Tuscaloosa, Alabama.
- Griffin, John W.
1974 Investigations in Russell Cave. *Publications in Archaeology* 13. National Park Service, Department of the Interior, Washington, D.C.
- Griffin, and Smith
1954 *The Cotton Site: An Archaeological Site of Early Ceramic Times in Volusia County, Florida*. Florida State University Studies 16. Tallahassee.
-

-
- Guy, John and Joel Gunn
1983 Settlement Pattern Hypothesis for West Central Louisiana. Manuscript on file.
- Haag, William G.
1971 *Louisiana in North American Prehistory*. Melanges 1. Baton Rouge: Louisiana State University.
- Hall, E. T.
1966 The Use of a Proton Magnetometer in Underwater Archeology. *Archaeometry* 9:32-44.

1970 Survey Techniques in Underwater Archeology. *Philosophical Transactions of the Royal Society*, London A.269:121-124.
- Hally, David J.
1972 *The Plaquemine and Mississippian Occupations of the Upper Tensas Basin, Louisiana*. Unpublished Ph.D. dissertation, Department of Anthropology, Harvard University, Cambridge.
- Haynes, C. V.
1991 Geoarchaeological and Paleohydrological Evidence for a Clovis Age Drought in North America and its Bearing on Extinction. *Quaternary Research* 35:438-450.
- Hildebrand, Franklin
n.d. *As I Remember*. Reprinted articles from *The Jennings Daily News*. Elizabeth Hildebrand Cagnon, Jennings, Louisiana.
- Hillman, M.
1990 Paleoindian Settlement on the Macon Ridge, Northeastern Louisiana. *Louisiana Archaeology* 12:203-218. (For 1985)
- Hudson, Charles
1978 *The Southeastern Indians*. The University of Tennessee Press.
- Jackson, H.E.
1991 Bottomland Resources and Exploitation Strategies during the Poverty Point Period: Implications of the Archaeological Record from the J.W. Copes Site. In *The Poverty Point Culture, Local Manifestations, Subsistence Practices, and Trade Networks*, edited by Kathleen M. Byrd, pp. 131-153. Geoscience and Man Vol. 29. Louisiana State University Press, Baton Rouge.
- Jefferson Davis Parish Planning Board [JDPPB]
1947 *Jefferson Davis Parish Resources and Facilities*. State of Louisiana, Department of Public Works, Planning Division, Baton Rouge.
- Jenkins, Ned J.
1979 Miller Hopewell of the Tombigbee Drainage. In *Hopewell Archaeology: The Chillicothe Conference*, edited by David S. Brose and N'omi Greber, pp. 171-180. Kent State University Press, Kent, Ohio.
-

Jeter, M. D., and H. E. Jackson

- 1990 Poverty Point Extraction and Exchange: The Arkansas Lithic Connections. *Exchange in the Lower Mississippi Valley and Contiguous Areas in 1100 B.C.*, Louisiana Archaeology 17:133-206.

Jeter, Marvin D., Jerome C. Rose, G. Ishmael Williams, Jr., and Anna M. Harmon

- 1989 *Archeology and Bioarcheology of the Lower Mississippi Valley and Trans-Mississippi South in Arkansas and Louisiana*. Arkansas Archeological Survey Research Series No. 37. Final Report Submitted to the U.S. Army Corps of Engineers, Southwestern Division Study Unit 6 of the Southwestern Division Archeological Overview. Contract No. DACW63-84-C-0149.

Jones, P.H., A.N. Turcan, Jr., and H.E. Skibitzke

- 1954 Geology and Ground-Water Resources of Southwestern Louisiana. Geological Bulletin No. 30, Louisiana Geological Survey, Baton Rouge.

Jones, Sam H.

- 1967 Industry Comes to Lake Charles. Chapter V of *The Centennial History of Lake Charles, 1867-1967*, edited by Donald J. Millet, n.p. Lake Charles Letter Shop, Lake Charles, Louisiana.

Kaufman, E. R.

- 1967 A Port City. Chapter VI of *The Centennial History of Lake Charles, 1867-1967*, edited by Donald J. Millet, n.p. Lake Charles Letter Shop, Lake Charles, Louisiana.

Keller, John E.

- 1988 *A Cultural Resources Survey of a Proposed Oxidation Pond Facility in Calcasieu Parish, Louisiana*. Southern Archaeological Consultants, Inc. Report on file at the Division of Archaeology, Office of Cultural Development, Louisiana Department of Culture, Recreation and Tourism, Baton Rouge, Louisiana.

Kelly, J. E.

- 1990 The Emergence of the Mississippian Culture in the American Bottom Region. In *The Mississippian Emergence*, edited by Bruce D. Smith, pp. 113-152. Smithsonian Institution Press, Washington, D.C.

Kidder, T. R.

- 1988 *Protohistoric and Early Historic Cultural Dynamics in Southeast Arkansas and Northeast Louisiana, A.D. 1542-1730*. Print in 1995 by U.M.I. Dissertation Information Service, Ann Arbor, Michigan.

- 1992 Timing and Consequences of the Introduction of Maize Agriculture in the Lower Mississippi Valley. *North American Archaeology* 13(1):15-41.

Kidder, Tristram R., and Gayle J. Fritz

- 1993 Investigating Subsistence and Social Change in the Lower Mississippi Valley: The 1989 and 1990 Excavations at the Reno Brake and Osceola Sites. *Journal of Field Archaeology* 20(3):281-297.

-
- Kimball, Larry R.
1996 Early Archaic Settlement and Technology: Lessons from Tellico. In *The Paleoindian and Early Archaic Southeast*, edited by David G. Anderson and Kenneth E. Sassaman. The University of Alabama Press, Tuscaloosa and London.
- Kniffen, F.B.
1968 *Louisiana: Its Land and People*. Louisiana State University Press, Baton Rouge.
- Knight, Vernon J., Jr.
1984 Late Prehistoric Adaptation in the Mobile Bay Region. *Perspectives on Gulf Coast Prehistory* edited by Dave D. Davis. University Presses of Florida, Gainesville, Florida.
- Kolb, C.R. and J.R. VanLopik
1958 Geology of the Mississippi River Deltaic Plain, Southeastern Louisiana. *Technical Report No. 3-483*, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.
- Kreiger, Alex D.
1953 New World Culture History: Anglo-America. In *Anthropology Today*, edited by A.L. Kroeber. University of Chicago Press, Chicago.
- Largent, F. B., M. R. Waters, and D. L. Carlson
1991 The Spatiotemporal Distribution and Characteristics of Folsom Projectile Points in Texas. *Plains Anthropologist* 36(137):323-341. Plains Anthropological Society.
- Larson, Lewis H., Jr.
1980 *Aboriginal Subsistence Technology on the Southeastern Coastal Plain during the Late Prehistoric Period*. The University Presses of Florida, Gainesville.
- Lehmann, G. R.
1982 *The Jaketown Site Surface Collections from a Poverty Point Regional Center in the Yazoo Basin, Mississippi*. Archaeological Report No. 9, Mississippi Department of Archives and History, Jackson, Mississippi.
- Lentz, David L.
1986 Archaeobotanical Remains from the Hester Site: The Late Paleo-Indian and Early Archaic Horizons. *Midcontinental Journal of Archaeology* 11(2):269-279.
- Louisiana Department of Public Works
1956 *The Feasibility of a Water Supply and Deep Water Industrial Channel Connecting the Calcasieu and Atchafalaya Rivers, Louisiana, a Preliminary Survey*. Department of Public Works, State of Louisiana, Baton Rouge.
-

Mainfort, Robert C.

- 1986 Pre- and Early Marksville Ceramics and Chronology in the Mid-South: A Perspective from Pinson Mounds. In *The Tchula Period in the Mid-South and Lower Mississippi Valley*. Proceedings of the 1982 Mid-South Archaeological Conference, Archaeological Report No. 17:52-62, Mississippi Department of Archives and History, Jackson, Mississippi.

Mason, Ronald J.

- 1962 The Paleo-Indian Tradition in Eastern North America. *Current Anthropology* 3:227-278.

Marler, Don C.

- 1995 *The Neutral Zone: Backdoor to the United States*. Dogwood Press, Woodville, Texas.

McIntire, William G.

- 1958 *Prehistoric Indian Settlements of the Changing Mississippi River Delta*. Louisiana State University Studies, Coastal Studies Series, No.1. Baton Rouge.

McGimsey, Charles R.

- 1996 *Pits, Points, and Potholes: Regional Archaeology Program Management Unit III 1995/96 Annual Report*. Prepared for the Department of the Interior, through the Department of Culture, Recreation, and Tourism, Office of Cultural Development, Division of Archaeology. Baton Rouge.

Menn, Joseph Karl

- 1964 *The Large Slaveholders of Louisiana - 1860*. Pelican Publishing Company, New Orleans.

Millet, Donald J.

- 1966 The Lumber Industry of "Imperial" Calcasieu: 1865-1900. *Louisiana History* 7(1):51-69.

Muller, Jon

- 1978 The Southeast. In *Ancient North Americans*, edited by J. D. Jennings, pp. 373-420. W. H. Freeman and Company, New York.

Murray, G.E.

- 1961 *Geology of the Atlantic and Gulf Coastal Province of North America*. Harper & Brothers, New York.

Neitzel, Robert S., J. Stephen Perry

- 1977 *A Prehistory of Central and North Louisiana*. Submitted to The Research Institute, Northeast Louisiana University.

Neuman, Robert

- 1976 *Report of an Archaeological Survey Along the Calcasieu River, Southwest Louisiana*.

-
- 1984 *An Introduction to Louisiana Archaeology*. Louisiana State University Press, Baton Rouge.
- Nichol, S.L., R. Boyd, and S. Penland
- 1992 Hydrology of a Wave-Dominated Estuary: Lake Calcasieu, Southwest Louisiana. *Gulf Coast Association of Geological Societies Transactions* 42:627-636.
- 1996 Sequence Stratigraphy of a Coastal Plain Incised Valley Estuary: Lake Calcasieu, Louisiana. *Journal of Sedimentary Petrology* 66(4):847-857.
- O'Neil, T.
- 1949 The Muskrat in the Louisiana Coastal Marshes. Louisiana Department of Wild Life and Fisheries, New Orleans.
- Parmalee, P. W.
- 1962 Faunal Remains from the Stanfield-Worley Bluff Shelter. *Journal of Alabama Archaeology* 8:112-114.
- Parmalee, P. W., R. B. McMillian, and F. B. King
- 1976 Changing Subsistence Patterns at the Rogers Shelter. In *Prehistoric Man and His Environments: A Case Study in the Ozark Highlands*, edited by W. R. Wood and R. B. McMillian, pp. 141-62. Academic Press, New York.
- Parsons Engineering Sciences, Inc.
- 1998 *Archeological Phase I Survey of Eight 90th Regional Support Command Facilities in Louisiana*. Parsons Engineering Science, Inc., Fairfax, Virginia. Submitted to CampPike Armed Forces Reserve, Office of the Engineer, 90th Regional Occupational Environmental Health Directorate, Detachment 1/Human Systems Center, Brooks Air Force Base, Texas.
- Peebles, Christopher S., and Susan M. Kus
- 1977 Some Archaeological Correlates of Ranked Societies. *American Antiquity* 42:421-448.
- Peebles, Christopher S., and Cyril B. Mann, Jr.
- 1983 Culture and Chronology in the Lubbub Creek Archaeology Locality. In *Excavations in the Lubbub Creek Archaeological Locality*, edited by C. S. Peebles, pp. 64-78, vol. 1, Prehistoric Agricultural Communities in West Central Alabama. Report Submitted to the U.S. Army Corps of Engineers, Mobile District.
- Penland, S., R.A. McBride, S.J. Williams, R. Boyd, and J.R. Suter
- 1991 Effects of Sea Level Rise on the Mississippi River Deltaic Plain. In N.C. Kraus, K.J. Gingerich, and D.L. Kriebel, eds., *Coastal Sediments '91, Proceedings of a Specialty Conference on Quantitative Approaches to Coastal Sediment Processes*, American Society of Civil Engineers, New York.
- Perino, Gregory
- 1985 *Selected Preforms, Points and Knives of the North American Indians*. Volume 1. Points and Barbs Press, Idabel, Oklahoma.
-

Perrault, S. L., and R. A. Weinstein

- 1994 *National Register Eligibility Testing at the Sarah Peralta Site, East Baton Rouge Parish, Louisiana*. Prepared for the Division of Archaeology, Office of Cultural Development, Louisiana Department of Culture, Recreation and Tourism, Coastal Environments, Inc., Baton Rouge.

Pertula, T.K. and J.E. Bruseth

- 1994 Trade and Exchange in Eastern Texas, 1100 B.C. - A.D. 800. *In Exchange in the Lower Mississippi Valley and Contiguous Area in 1100 B.C.* Bulletin of the Louisiana Archaeological Society No.17. Lafayette.

Phillips, Phillip

- 1970 Archeological Survey in the Lower Yazoo Basin, Mississippi, 1949-1955. *Papers of the Peabody Museum*, Vol. 60. Harvard University, Cambridge.

Phillips, P., J. A. Ford, and J. B. Griffin

- 1951 *Archaeological Survey in the Lower Mississippi Alluvial Valley, 1940-1947*. Papers of the Peabody Museum of American Archaeology and Ethnology Vol. 25, Harvard University, Cambridge.

Pittman, Philip

- 1973 *The Present State of the European Settlements on the Mississippi*. Facsimile reproduction. University of Florida Press, Gainesville. Originally published 1770, J. Nourse, London.

Post, Lauren C.

- 1962 Some Notes on the Attakapas Indians of Southwestern Louisiana. *Louisiana History*, 3(3):221-242.

Quimby, George I., Jr.

- 1951 The Medora Site, West Baton Rouge Parish, Louisiana. *Field Museum of Natural History, Anthropological Series*, Vol. 24, No. 2, pp. 81-135. Chicago.

Raphael, Morris

- 1976 *The Battle in the Bayou Country*. 2nd printing. Harlo Press, Detroit.

Roy, A.J. and C.T. Midkiff

- 1988 *Soil Survey of Calcasieu Parish, Louisiana*. U.S. Department of Agriculture, Soil Conservation Service, Washington, DC.

Ryan, Joanne, Thurston H.G. Hahn III, and E. Burton Kemp III

- 1996 *Cultural Resources Investigations of the Smith Family Cemetery Site, (16CU07) in Westlake, Calcasieu Parish, Louisiana*. Coastal Environments, Inc., Baton Rouge, Louisiana. Submitted to The Gray Law Firm, Lake Charles, Louisiana.

-
- Ryan, Joanne, Thurston H.G. Hahn III, and E. Burton Kemp
1996 *Cultural Resources Investigation of the Smith Family Cemetery Site (16CU07) in Westlake, Calcasieu Parish, Louisiana*. Prepared for the Gray Law Firm, Lake Charles, Louisiana. Report on file at the Division of Archaeology, Department of Culture, Recreation and Tourism, Baton Rouge.
- Saucier, Roger T.
1963 Recent Geomorphic History of the Pontchartrain Basin, Louisiana. Coastal Studies Series No. 9, Louisiana State University Press, Baton Rouge.

1977 The Northern Gulf Coast During the Farmdalian Substage: A Search for Evidence. Miscellaneous Paper Y-77-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

1981 Current Thinking on Riverine Processes and Geological History as Related to Human Settlement in the Southeast. *Geoscience and Man* 22:7-18.

1994 Geomorphology and Quaternary Geologic History of the Lower Mississippi Valley. 2 volumes. U.S. Army Corps of Engineers, Mississippi River Commission, Vicksburg, Miss.
- Saucier, R.T. and J.I. Snead (compilers)
1989 Quaternary Geology of the Lower Mississippi Valley. 2 sheets. Louisiana Geological Survey, Baton Rouge.
- Schumacher, B. A., W. J. Day, M. C. Amacher, and B. J. Miller
1988 *Soils of the Mississippi River Alluvial Plain in Louisiana*. Louisiana Experimental Station Bulletin, No. 796, Agricultural Center, Louisiana State University, Baton Rouge.
- Seymour, Geneva Bailey (editor)
1980 *1850 Census of Calcasieu Parish, Louisiana*. Hebert Publications, Cecilia, Louisiana.

1982 *1840 Census of Calcasieu Parish, Louisiana*. Books by GBS, Lubbock, Texas.
- Shenkel, J. R.
1974 Big Oak and Little Oak Islands: Excavations and Interpretations. *Louisiana Archaeology* 1:37-65.

1981 Pontchartrain Tchefuncte Site Differentiation. *Louisiana Archaeology* 8:21-35.
- Shenkel, J. Richard, and Jon L. Gibson
1974 Big Oak Island: An Historical Perspective of Changing Site Function. *Louisiana Studies* 13(2):173-186. Natchitoches, Louisiana.
-

Shuman, Malcolm K.

- 1990 *Level II Cultural Resources Survey of a Proposed Chlorine Pipeline, Calcasieu Parish, Louisiana*. Surveys Unlimited Research Associates, Inc., Baton Rouge, Louisiana. Submitted to Ford, Bacon & Davis Sealants, Inc., Monroe, Louisiana.

Shutts, Elmer E.

- 1967 The Lumber Industry from 1900 – The Golden Era. Chapter IV of *The Centennial History of Lake Charles, 1867-1967*, edited by Donald J. Millet, n.p. Lake Charles Letter Shop, Lake Charles, Louisiana.

Smith, B.D.

- 1975 Prehistoric Settlement Patterns of the Young's Bayou Drainage, Natchitoches Parish, Louisiana. *Bulletin of Louisiana Archaeological Society Newsletter*, Vol.3, No.4, pp 6-10.
- 1986 Archaeology of the Southeastern United States: From Dalton to de Soto, 10,500 B.P. - 500 B.P. In *Advances in World Archaeology* 5:1-92, edited by F. Wendorf and A. Close. Academic Press, New York.
- 1987 The Independent Domestication of Indigenous Seed-Bearing Plants in Eastern North America. In *Horticultural Economies of the Eastern Woodlands*, edited by William Keegan, pp. 3-48. Southern Illinois University, Carbondale. Center for Archaeological Investigations Occasional Paper 7.

Smith, Steven D., Philip G. Rivet, Kathleen M. Byrd, and Nancy C. Hawkins

- 1983 *Louisiana's Comprehensive Archaeological Plan*. State of Louisiana, Department of Culture, Recreation and Tourism, Office of Cultural Development, Division of Archaeology, Baton Rouge.

Southern Pacific-Sunset Route [SP-SR]

- Ca. 1909 *A Comprehensive Review of the Agricultural Resources and Future Possibilities of Jennings and Calcasieu Parish, Louisiana*. Passenger Department, Southern Pacific-Sunset Route, New Orleans.

Speaker, John Stuart, Joanna Chase, Carol Poplin, Herschel Franks, and R. Christopher Goodwin

- 1986 *Archeological Assessment of the Barataria Unit, Jean Lafitte National Historical Park*. Submitted by R. Christopher Goodwin & Associates, Inc., to the National Park Service, Southwest Region, Santa Fe.

Springer, James W.

- 1974 The Bruly St. Martin Site and Its Implications for Coastal Settlement in Louisiana. *Louisiana Archaeology* 1:75-80.
- 1979 Excavations at the Pierre Clement Site, Cameron Parish, Louisiana. *Louisiana Archaeology* 4:53-90.

Stahls, Paul F., Jr.

- 1979 *Plantation Homes of the Teche Country*. Pelican Publishing Company, Gretna, Louisiana.
-

Steponaitis, Vincas P.

1983 *Ceramics, Chronology, and Community Patterns: An Archaeological Study at Moundville*. Studies in Archaeology. Stuart Struever, consulting editor. Academic Press, New York.

1986 Prehistoric Archaeology in the Southeastern United States, 1970 - 1985. *Annual Review of Anthropology* 15:363-404

Stopp Jr., G. Harry

1975 Letter Report on file at the Division of Archaeology, Office of Cultural Development, Louisiana Department of Culture, Recreation and Tourism, Baton Rouge, Louisiana.

Story, D. A., J. A. Guy, B. A. Burnett, M. D. Freeman, J. C. Rose, D. G. Steele, B. W. Olive, and K. J. Reinhard

1990 *The Archeology and Bioarcheology of the Gulf Coastal Plain: Volume 1*. Arkansas Archeological Survey Research Series No. 38.

Swanton, John R.

1946 *The Indians of the Southeastern United States*. Smithsonian Institution, Bureau of American Ethnology Bulletin 137.

Swent, Vivian Hébert (compiler)

1966 *Imperial Calcasieu Records*, vol. 1. Published by compiler, San Francisco, California.

Thomas, Prentice M. Jr., and L. Janice Campbell

1978 *Archaeological Survey of a Portion of the Calcasieu LNG Project*. Submitted by New World Research, New Orleans, Louisiana, to EMANCO, Inc., Houston, Texas.

1978 *The Peripheries of Poverty Point*. New World Research, Report of Investigations, No. 12.

Thorndale, William, and William Dollarhide

1985 *Map Guide to the U.S. Federal Censuses*. Dollarhide Systems, Bellingham, Washington.

Tite, M.S.

1972 *Methods of Physical Examination in Archeology*. Seminar Press, New York.

Toth, Edwin Alan

1977 *Early Marksville Phases in the Lower Mississippi Valley: A Study of Culture Contact Dynamics*. Ph.D. dissertation, Harvard University.

1988 *Early Marksville Phases in the Lower Mississippi Valley: A Study of Culture Contact Dynamics*. Archaeological Report No. 21. Mississippi Department of Archives and History, Jackson, Mississippi in cooperation with The Lower Mississippi Survey, Harvard University.

Turner, Ellen Sue and Thomas R. Hester

1985 *A Field Guide to Stone Artifacts of Texas Indians*. Texas Monthly Press, Austin.

U.S. Secretary of War [OR]

1889 *The War of the Rebellion: A Compilation of the Official Records of the Union and Confederate Armies*, Series I, vols. XXVI(2) and XXXIV(3). Government Printing Office, Washington, D.C.

Walthall, John A.

1980 *Prehistoric Indians of the Southeast, Archaeology of Alabama and the Middle South*, The University of Alabama Press, University, Alabama.

Webb, Clarence H.

1981 *Stone Points and Tools of Northwestern Louisiana*. Special publication of the Louisiana Archaeological Society, No. 1.

1982 *The Poverty Point Culture*. Geoscience and Man Vol. XVII, Revised second printing, School of Geoscience, Louisiana State University, Baton Rouge.

Webb, Clarence H., F. E. Murphey, W. E. Ellis, and H. R. Green

1969 The Resch Site 41HS16, Harrison County, Texas. *Bulletin of the Texas Archeological Society*, Vol. 40:3-106.

Webb, Clarence H., Joel L. Shiner, and E. Wayne Roberts

1971 The John Pearce Site (16CD56): A San Patrice Site in Caddo Parish. *Bulletin of the Texas Archaeological Society*, Vol. 42, pp 1-49. Dallas.

Weinstein, R. A.

1985 Development and Regional Variation of Plaquemine Culture in South Louisiana. Paper presented at the 6th Mid-South Archaeological Conference, Starkville, Mississippi.

1986 Tchefuncte Occupation in the Lower Mississippi Delta and Adjacent Coastal Zone. In *The Tchula Period in the Mid-South and Lower Mississippi Valley*. Proceedings of the 1982 Mid-South Archaeological Conference, Archaeological Report No. 17:102-127, Mississippi Department of Archives and History, Jackson, Mississippi.

Weinstein, Richard A., Diane E. Wiseman, Laura A. Landry, and Wayne P. Glander

1979 *Environment and Settlement on the Southwestern Louisiana Prairies: A Cultural Resources Survey in the Bayou Mallet Watershed*. Coastal Environments, Inc., Baton Rouge. Submitted to the U.S. Soil Conservation Service, Alexandria LA, and Interagency Archeological Services, Atlanta.

Weinstein, Richard A., and Philip G. Rivet

1978 Beau Mire: A Late Tchula Period Site of the Tchefuncte Culture, Ascension Parish, Louisiana. *Anthropological Report 1*. State of Louisiana, Department of Culture, Recreation and Tourism, Baton Rouge.

Wentz, Helen (compiler)

- 1958 *History of Cantonment Atkinson*. Calcasieu Chapter, D.A.R. Manuscript on file, Louisiana Collection, Howard-Tilton Memorial Library, Tulane University, New Orleans.

Weymouth, John W.

- 1986 Geophysical Methods of Archaeological Site Surveying. In *Advances in Archaeological Method and Theory, Volume 9*. Academic Press, New York.

Wiley, G. R.

- 1949 *Archeology of the Florida Gulf Coast*. Smithsonian Miscellaneous Collections Vol. 113, Bureau of American Ethnology, Smithsonian Institute, Washington, D.C.

Wiley, Gordon R., and Phillip Phillips

- 1958 *Method and Theory in American Archaeology*. The University of Chicago Press, Chicago.

Williams, Stephen, and Jeffrey P. Brain

- 1983 *Excavations at the Lake George Site, Yazoo County, Mississippi, 1958-1960*. Papers of the Peabody Museum of Archaeology and Ethnology Vol. 74. Harvard University, Cambridge.

Winters, John D.

- 1963 *The Civil War in Louisiana*. Louisiana State University Press, Baton Rouge.

MAPS

[Boynton, G. W.]

- ca. 1838 *Louisiana*. Sheet 38. Undated and unidentified map in possession of Stephen Hinks. Smaller version of map, dated 1838 and engraved by G. W. Boynton, on file, Shreve Public Library, Shreveport, Louisiana.

Campbell, Edna F.

- 1921 William Darby's (*A*) *Map of the State of Louisiana, with Part of the Mississippi Territory*. Reprinted in reduced form in New Orleans at the Time of the Louisiana Purchase. *The Geographical Review* 11:416. Originally published 1816 in *A Geographical Description of the State of Louisiana*, John Melish, Philadelphia.

DTC, Incorporated

- 1992 *Calcasieu Parish, Louisiana, Crude & Product* [East and West Sections]. DTC, Houston.
- 1992 *Calcasieu Parish, Louisiana, Natural Gas* [East and West Sections]. DTC, Houston.
- 1992 *Lake Charles Detail*. DTC, Houston. Holle & Co.

-
- 1861 *Hydrographical & Topographical Map of Parts of the States of Louisiana, Mississippi & Alabama.* Map on file, Louisiana Collection, Howard-Tilton Memorial Library, Tulane University, New Orleans.

Mitchell, S. Augustus

- 1845 *Map of the States of Louisiana, Mississippi & Alabama.* Map on file, Special Collections, Hill Memorial Library, Louisiana State University, Baton Rouge.
- 1849 *A New Map of Louisiana.* Microfilm copy on file, Regional Archives, Sandell Library, Northeast Louisiana University, Monroe.
- 1860 *County Map of Louisiana, Mississippi, and Arkansas.* Map on file, Mississippiana Collection, McCain Library and Archives, University of Southern Mississippi, Hattiesburg.

Rand, McNally & Company

- 1881 *Louisiana.* Map on file, Map Division, Library of Congress.
- 1899 *Map of Louisiana.* In *Indexed Atlas of the World.* Copy on file, Louisiana Collection, Howard-Tilton Memorial Library, Tulane University, New Orleans.

Snead, J.I. and R.P. McCulloh (compilers)

- 1984 *Geologic Map of Louisiana.* Scale 1:500,000. Louisiana Geological Survey, Baton Rouge.

Tanner, H. S.

- 1820 *Louisiana and Mississippi.* Map on file, Map Division, Library of Congress.

Unidentified surveyor

- 1760 *Untitled map of Louisiana.* Map on file, Geography and Map Division, Library of Congress, Washington, D.C.

PERSONAL COMMUNICATIONS

Joseph Anthony Giliberti, 1995

Charles Olmsted, 1998

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Special thanks are also due to the staffs of the following repositories: The Louisiana Department of Culture, Recreation and Tourism, Office of Cultural Development, Divisions of Archaeology and Historic Preservation, the Howard-Tilton Memorial Library at Tulane University, and the Library of Allen Green, Hammond, Louisiana. Particular thanks are extended to Mr. Steven Verry of NOAA for providing a prompt response to our request for information from the Automated Wreck and Obstruction Information System.

APPENDIX I

SCOPE OF WORK

SCOPE OF SERVICES
Contract DACW29-97-D-0018

**REMOTE SENSING INVESTIGATION FOR
THE CALCASIEU SALTWATER BARRIER**

1. Introduction

This delivery order calls for a remote sensing survey to identify underwater cultural resources for a bank repair project at the Calcasieu River Saltwater Barrier. Bank erosion upstream of the saltwater barrier has resulted in saltwater circumventing the barrier. The U.S. Army Corps of Engineers, New Orleans District (NOD) plans to repair the bank along an area of approximately 6,700 feet along the left descending bank of the Calcasieu River. A non-continuous rock dike will be constructed of armor stone and a crushed stone core near the Calcasieu River saltwater barrier to repair breached locations. Approximately 12,000 tons of stone will be placed in five locations.

2. Project Area

The project area is located along the left descending bank of the Calcasieu River in the vicinity of the Calcasieu River Saltwater Barrier. The area to be surveyed is approximately 6,700 feet in length and 150 feet wide. Attachment 1 illustrates the location of the project area.

3. General Nature of the Work

The fieldwork will include underwater survey methods to identify and record shipwrecks or other cultural resources which may exist in the project area. The underwater investigations will include systematic magnetometer and side-scan sonar survey using precise navigation control. A sub-bottom profiler will also be used in the study. All magnetic and sonar anomalies will be interpreted based on expectations of the character of shipwreck signatures. No diving will be performed under this delivery order.

4. Study Requirements

The study will be conducted utilizing current professional standards and guidelines including, but not limited to:

- the National Park Service's National Register Bulletin 15 entitled "How to Apply the National Register Criteria for Evaluation";

- the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation as published in the Federal Register on September 29, 1983;
- Louisiana's Comprehensive Archaeological Plan, dated October 1, 1983;
- The Advisory Council on Historic Preservation's regulation 36 CFR Part 800 entitled, "Protection of Historic Properties";
- the Louisiana Submerged Cultural Resource Management Plan published by the Division of Archaeology in 1990.

The study will be conducted in three phases: Review of Background Sources, Fieldwork, and Data Analyses and Report Preparation.

a. Phase 1: Literature Search and Records Review. The Contractor shall commence, upon work item award, with a literature, map, and records review specific to the study area. This phase shall include a review and synthesis of the archeological, historical and geomorphologic reports covering the study area. The National Register of Historic Places and the State Archeologist's site and shipwreck database files will be consulted to establish a current and complete distribution of historic properties in the study area. At a minimum, the background research and records review will be sufficient for developing the historic context of the study area and should be to a level sufficient for assessing the significance of any sites recorded as a result of the field investigations.

b. Phase 2: Fieldwork. Upon completion of Phase 1, the contractor shall proceed with execution of the underwater survey.

The equipment array required for the remote sensing investigation will include:

- (1) a marine magnetometer,
- (2) a positioning system,
- (3) a side-scan sonar system,
- (4) and a sub-bottom profiler.

The following requirements apply to the underwater survey:

- (1) transect lane spacing will be at least 25 feet;
- (2) positioning control points will be obtained at least every 100 feet along transects;
- (4) background noise will not exceed +/- 3 gammas;
- (5) magnetic data will be recorded on 100-gamma scale;

(6) the magnetometer sensor will be towed a minimum of 2.5 times the length of the boat or projected in front of the survey vessel to avoid noise from the survey vessel;

(7) the survey will utilize the Louisiana State Plane Coordinate System (NAD 1983);

(8) a metal probe will be used to identify the boundaries of any potentially significant sites in the project area.

c. Phase 3: Data Analyses and Report Preparation. All data collected in conjunction with this investigation will be analyzed using currently acceptable scientific methods and will be conducted in accordance with the contractor's proposal. The post-survey data analyses and report presentation covering the underwater survey results will include as a minimum:

- (1) post-plots of survey transects and data points;
- (2) same as above with magnetic data included;
- (3) plan views of all potentially significant anomalies showing transects, data points and contours; and
- (4) correlation of magnetic, sonar, and fathometer data, where appropriate.

The interpretation of identified magnetic anomalies will rely on expectations of the character (i.e., signature) of shipwreck magnetics derived from the available literature. Interpretation of anomalies will also consider probable post-depositional impacts and the potential for natural and modern, i.e., insignificant, sources of anomalies. The Contractor will file state site forms with the Louisiana State Archeologist and cite the resulting state-assigned site numbers in the final report for any anomaly classified as a site.

The draft and final reports will present the results of the survey and recommendations for any additional work. An inventory of all anomalies recorded during the underwater survey, with recommendations for further identification and evaluation procedures will be included as appropriate. The discussions must include justifications for the selection of specific targets for further evaluation. The potential for each target or submerged historic property to contribute to archeological or historical knowledge will be assessed. Thus, the Contractor will classify each anomaly as either potentially eligible for inclusion in the National Register, or not eligible. Sonar images of potentially significant anomalies should be referenced and included in the report.

The contractor shall fully support his recommendations regarding site significance. The report will include a summary

table listing all anomalies. At a minimum, the table will include the following information: project name; survey segment/area; magnetic target number; gamma intensity; target coordinates, target size, association, description of sonar data.

Reports are to include an assessment of potential significance and recommendations for further work. Recommendations for equipment and methodology to be employed in future evaluation studies must be discussed in detail. Additional requirements for the management summary, draft, and final reports are contained in Section 5 of this Scope of Services.

5. Draft and Final Reports

Five copies of a draft report integrating all phases of this investigation will be submitted to the COR for review and comment within 6 weeks after the date of the award. The final report shall follow the format set forth in MIL-STD-847A with the following exceptions: (1) separate, soft, durable, wrap-around covers will be used instead of self covers; (2) page size shall be 8-1/2 x 11 inches with 1-inch margins; (3) the reference format of American Antiquity will be used. Spelling shall be in accordance with the U.S. Government Printing Office Style Manual dated January 1973.

The COR will provide all review comments to the Contractor within 8 weeks after receipt of the draft reports (14 weeks after date of order). Upon receipt of the review comments on the draft report, the Contractor shall incorporate or resolve all comments and submit one preliminary copy of the final report to the COR within 5 weeks (19 weeks after date of order). Upon approval of the preliminary final report by the COR, the Contractor will submit 1 reproducible master copy, 1 copy on floppy diskette, 35 copies of the final report, and all separate appendices to the COR within 20 weeks after date of order. A copy of the Scope of Services shall be bound as an appendix with the Final Report. The Contractor shall also supply a complete listing of all computer files submitted. This listing will include file names, file types, disk number, and file description.

6. Weather Contingencies

The potential for weather-related delays during the underwater survey necessitates provision of one weather contingency day in the delivery order. If the Contractor experiences unusual weather conditions, he will be allowed additional time on the delivery schedule but no cost adjustment.

7. Attachments

Attachment 1. Map showing the study area

APPENDIX II

**RESUMES OF KEY
PROJECT PERSONNEL**

CHRISTOPHER R. POLGLASE, M.A., A.B.D.
VICE PRESIDENT- ARCHEOLOGICAL SERVICES, MID-ATLANTIC REGIONAL OFFICE

Mr. Christopher Polglase received his baccalaureate degree from William and Mary in 1980, his M.A. from SUNY Binghamton in 1985, and he currently is A.B.D. at that institution. At SUNY Binghamton, Mr. Polglase served as a teaching, research, and graduate assistant. Also at that institution, he edited the multi-volume report on excavations at the Utqiagvik Village site in Barrow, Alaska. At the Archeological Society of Virginia, the Society for Archaeological Sciences, and the Society for American Archeology, Mr. Polglase received considerable cultural resource experience with the Public Archeology Facility at SUNY Binghamton, where he served as crew chief on numerous Phase I-III projects. In Virginia, Mr. Polglase served as crew chief for three seasons at Fort Christanna, an early eighteenth century frontier outpost in Brunswick County, and as field supervisor for the Phase I survey of the proposed Roanoke River Parkway. He also has participated in large multi-season excavations in Barrow, Alaska, and in Italy.

At R. Christopher Goodwin & Associates, Inc., Mr. Polglase has worked on numerous archeological projects in Maryland, Pennsylvania, Virginia, North Carolina, West Virginia, Puerto Rico, Florida, and the District of Columbia. He has directed data recovery at numerous prehistoric sites in Howard, Charles, Anne Arundel, and Frederick Counties, Maryland, and the City of Chesapeake, Virginia. He also has directed Phase II archeological investigation of prehistoric and historic period sites in Central Maryland, West Virginia, Northern Virginia, Washington, D.C., and Tidewater Virginia. Two of those projects, excavations at the Russett Center and at the 10,000 year old Garman Site, received the Excellence in Archeology Awards from the Anne Arundel County Trust for Historic Preservation in 1991 and 1992. His recent projects have included: Phase II evaluations of 18 prehistoric and historic sites at Fort Belvoir, Fairfax County; Phase I-III archeological investigations for the Moorefield Local Flood Control Project, West Virginia; preparation of the cultural resource management plans for the Department of Energy's Morgantown, West Virginia, Energy Technology center and for Aberdeen Proving Ground; Phase II archeological evaluation of Civil War earthworks in Newport News, Virginia; Phase I-III archeological investigations for the Main Street Annapolis project; and Phase I-III archeological investigations for the Juvenile Justice Center, Baltimore, Maryland. In addition, he has directed the preparation of multi-disciplinary historical and cultural resource planning materials for the U.S. Army Corps of Engineers, the Atlantic Division of Naval Facilities Engineering Command, and for the Maryland Port Administration.

His research interests include lithic analysis, obsidian analysis, and long-distance exchange; in addition to numerous technical reports, he has published papers in the *Journal of Archeological Science*, *Preistoria Alpina*, and the *Journal of Middle Atlantic Archaeology*. He has presented professional papers to the Society for American Archeology, the Middle Atlantic Archeological Conference, the Archeological Societies of Maryland and Virginia, the Eastern States Archeological Federation, the Center for Medieval and Early Renaissance Studies, and the Valle dei Cavalieri.

JEAN B. PELLETIER, M.A.

NAUTICAL ARCHAEOLOGIST/REMOTE SENSING SPECIALIST

Jean B. Pelletier, M.A., graduated from the University of Maine in 1991 with a Bachelors degree in Geological Sciences, and received a Master of Arts degree in History from University of Maine in 1998. His research interests include maritime history and nautical archaeology, steamboat technology, industrial technology, remote sensing, geophysics, scientific diving technology, and underwater photography/videography. Mr. Pelletier has formal training in marine geophysics, remote sensing, remotely operated vehicles, and diving safety, and has conducted archaeological, archival, and geophysical investigations in Connecticut, Delaware, Louisiana, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Virginia. As a graduate student at the University of Maine, Mr. Pelletier worked with Dr. Warren C. Riess as a research assistant on the Penobscot Expedition Phase II, conducting remote sensing and underwater documentation of the ships of the Penobscot Expedition.

Before joining Goodwin and Associates Inc. in 1997 Mr. Pelletier served as an archaeological and scientific diving consultant for several universities and public utility companies along the Atlantic seashore. In this capacity, Mr. Pelletier managed the recovery of nine cannons from the *Nottingham Galley*, an eighteenth century English merchant ship lost on the ledges of Boon Island, Maine.

Since joining Goodwin & Associates Inc., Mr. Pelletier has been involved in numerous Phase I, II, and III archaeological investigations of underwater sites. He has conducted remote sensing surveys in the Gulf of Mexico, Chesapeake Bay, and a Phase III recordation of the steamboat *Kentucky*, a confederate troop-transport lost on the Red River in 1865, near Shreveport, Louisiana. Mr. Pelletier's professional affiliations include: American Academy of Underwater Sciences, Marine Archaeology and Historical Research Institute (MAHRI), and the Society for Historical Archaeology.

DAVID W. TRUBEY
NAUTICAL ARCHEOLOGIST

David W. Trubey graduated from the University of Massachusetts at Lowell in 1989 where he received a B.A. in History and the History Department's Outstanding Academic Achievement Award. Mr. Trubey will be receiving a Master of Arts degree in Historical Archaeology from the University of Massachusetts-Boston in 1998.

Before joining R. Christopher Goodwin and Associates, Mr. Trubey served as a field archaeologist and research assistant for the Massachusetts Board of Underwater Archaeological Resources from 1995-1998. Among numerous projects with the Board, David worked with the U.S. Naval Historical Center in compiling a comprehensive inventory of naval shipwrecks sites and resource management plan. During the field seasons of 1995-1997, he served as a Team Leader for the Institute for New Hampshire Studies-Plymouth State College excavation of an early eighteenth-century shipwreck at New Castle, NH. Mr. Trubey has also contributed historical and archaeological research for the cultural resource management of the Stellwagen Bank National Marine Sanctuary off the coast of Massachusetts. His research interests include remote sensing, maritime history and archaeology, and eighteenth and nineteenth-century canal construction.

Mr. Trubey is a PADI certified scuba diver and member of the Society for Historical Archaeology, Maritime Archaeology Research Institute, and the North American Society of Oceanic History.

SUSAN BARRETT SMITH, B.A.

HISTORIAN

Ms. Susan Barrett Smith, B.A., graduated from Southeastern Louisiana University in 1976 with a Bachelor of Arts in History. Ms. Smith also completed two years of graduate work in History at Southeastern. Academic awards and activities included a graduate assistantship in the History Department of Southeastern and membership in Phi Alpha Theta, the history honor society, and in Pi Gamma Mu, the social science honor society. Professional research experience includes two years as an independent mineral abstractor for David Parnell & Associates (1981 - 1983) and six years as the out-of-parish (statewide) research coordinator for Title Research Corporation (1983 - 1989). Through past and present employment, Ms. Smith has conducted courthouse research throughout Louisiana and western Mississippi. Besides title chain research, she also specializes in archival and historical research and has worked successfully for R. Christopher Goodwin & Associates, Inc., on numerous projects throughout Louisiana, Mississippi, and Florida.

JEREMY P. PINCOSKE, B.A.

SENIOR ARCHEOLOGICAL TECHNICIAN

Mr. Jeremy Pincoske was awarded a Bachelor of Arts in Anthropology from the State University of New York at Stony Brook. Upon graduation, Mr. Pincoske obtained employment with the Maine Historic Preservation Commission as a Museum Technician where he participated in the excavation of prehistoric, as well as historic period archeological site in Maine.

Since joining R. Christopher Goodwin & Associates, Inc., Mr. Pincoske has served as an Archeological Technician or Crew Chief on Phase I projects throughout the southeastern United States. Most notably, Mr. Pincoske was involved in all phases of the Florida Gas Transmission Company Phase III Expansion Project throughout Louisiana, Mississippi, Alabama, and Florida. His participation in these Phase I, II, and III surveys included supervising fieldwork, conducting archival research, and co-authoring numerous reports. In addition, Mr. Pincoske served as Crew Chief for data recovery efforts at Nina Plantation, Pointe Coupee Parish, Louisiana. Upon promotion to Senior Archeological Technician, Mr. Pincoske worked on several projects designed to assess the NAGPRA compliance needs of U. S. Army Corps of Engineers' Districts located throughout the eastern United States. Currently, he is assisting in the report production for Nina Plantation.

PATRICK P. ROBBLEE, M.A.

ASSISTANT PROJECT MANAGER

Mr. Patrick P. Robblee received his Bachelor of Arts cum laude in Anthropology from the University of Massachusetts at Amherst in 1993. He completed his Master's Degree in Anthropology with a specialization in Historical Archaeology at The College of William and Mary in Virginia in 1995. Mr. Robblee has considerable field experience on historic archeological sites in the Virginia Chesapeake, the Caribbean, and Bermuda including a Revolutionary War earthwork, a Revolutionary War barrack, a seventeenth century plantation house, an eighteenth century garden, a seventeenth century British fort, an eighteenth century sugar plantation, and several eighteenth century domestic houses. Since joining R. Christopher Goodwin & Associates, Inc. in February of 1996, Mr. Robblee has worked as an assistant project manager on a large Phase I project in northwestern Alabama and directed Phase I projects in Alabama, Texas, and Louisiana. Currently, he is working on a Phase II project of a nineteenth century landing site on the Mississippi River in Point Coupee Parish, Louisiana.